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FINAL COMPREHENSIVE Environmental Impact Study Appendices

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APPENDIX A

APPENDIX A

TABLE A-1

MONTANA DEPARTMENT OF STATE LANDS
SUSPECT LEVELS IN OVERBURDEN AND TOPSOIL MATERIAL

Analysis	Suspect Level
Electrical Conductivity	>4-6 mmhos/cm
Sodium adsorption ratio	>12 $(meq/liter)^{1/2}$
Mechanical analysis	Clay >40% Loamy sand and sand
Saturation %	none
pH	>8.8-9.0
PO_4-P	none
NO_3-N	variable
NH_4-N	unknown
Cd	>0.1-1.0 ppm
Cu	>40 ppm
Fe	unknown
Pb	pH < 6, >10-15 ppm pH > 6, >15-20 ppm
Mn	>60 ppm
Hg	>0.4-0.6 ppm
Se	>2.0 ppm
Mo	>0.3 ppm
B	>8.0 ppm
Zn	>30-40 ppm
Ni	DTPA extraction: >1.0 ppm

mmhos/cm = millimhos per centimeter (EC x 10^3 @ 25°C)
meq/liter = milliequivalents per liter
ppm = parts per million
DTPA = Diethylenetriaminpentacetic Acid

APPENDIX B

APPENDIX B

TABLE 1

SUMMARY OF QUALITY OF WATER FROM THE SEVERAL AQUIFERS IN
AREA C AND ROSEBUD MINE
(Concentrations Expressed in Milligrams per Liter Unless Otherwise Noted)

Aquifer	Number Wells	Specific Conductance Micromhos/cm	Total Dissolved Solids	Total Hardness	Calcium	Magnesium	Sodium	Bicarbonate	Sulfate	Chloride
Rosebud Spoils										
Average Rosebud Mine	32	3,241	2,986	2,199	324	333	138	687	1,837	21
Range	32	1,576-6,500	1,044-6,483	548-6,251	64-580	84-770	20-422	205-3,750	417-1,587	0.0-65
Valley Fill Material										
Average Area C	8	2,660	2,460	1,530	169	264	157	538	1,350	16
Average Rosebud Mine	40	2,982	2,767	1,778	257	268	177	536	1,629	20
Range Area C	8	1,670-4,040	1,350-4,680	837-2,430	114-287	135-417	46-279	486-581	584-2,500	2-45
Range Rosebud Mine	40	1,670-4,530	1,340-5,160	837-3,240	114-718	129-613	46-493	183-678	584-3,140	2-95
Rosebud Overburden										
Average Area C	3	2,046	1,782	1,168	172	180	110	491	955	15
Average Rosebud Mine	22	1,491	1,246	844	102	143	82	481	620	12
Range Area C	3	620-2,968	400-2,536	309-1,794	53-262	43-276	11-176	310-662	74-1,472	8-30
Range Rosebud Mine	22	500-3,150	335-3,098	306-1,794	19-278	43-297	7-462	21-1,202	71-2,056	1-81
Rosebud Coal										
Average Area C	14	1,850	1,660	921	138	148	131	466	794	8
Average Rosebud Mine	55	2,111	1,888	1,206	176	186	132	573	985	14
Range Area C	14	540-5,540	334-6,520	239-2,840	42-284	33-517	11-536	304-684	57-3,390	1-32
Range Rosebud Mine	55	540-5,540	334-6,520	142-3,590	29-581	17-521	10-536	25-1,128	57-3,390	0.5-109
Rosebud/McKay Interburden										
Average Area C	2	2,415	2,180	1,125	201	152	221	555	1,112	6
Average Rosebud Mine	15	2,173	1,770	1,044	211	123	176	503	959	12
Range Area C	2	1,940-2,890	1,660-2,700	1,050-1,200	156-246	143-162	104-338	540-570	774-1,450	4-8
Range Rosebud Mine	15	703-3,760	538-3,590	282-3,085	45-815	35-323	21-565	56-832	158-2,170	0.8-28
McKay Coal										
Average Area C	8	2,470	1,910	643	115	86	362	493	986	8
Average Rosebud Mine	42	2,606	2,295	1,147	195	161	279	531	1,296	12
Range Area C	8	957-3,730	616-2,650	64-1,370	15-247	6-183	34-748	391-554	149-1,560	2-16
Range Rosebud Mine	42	750-9,130	546-9,843	37-7,630	6-540	0.2-945	31-748	22-914	121-7,560	2-189
Sub-McKay										
Average Area C	2	2,335	1,900	1,008	154	152	232	341	1,068	7
Average Rosebud Mine	7	2,646	2,182	855	152	116	377	471	1,240	9
Range Area C	2	2,190-2,480	1,600-2,200	695-1,320	117-192	98-206	157-299	193-489	917-1,200	7-8
Range Rosebud Mine	7	1,330-4,140	946-3,210	211-1,740	47-265	16-263	120-995	273-554	35-1,990	2-14
	(19)		(890-3,320)							

APPENDIX B
TABLE 2

SUMMARY OF QUALITY OF WATER FROM THE ROSEBUD AND BIG SKY MINES[1]

Aquifer	Number of Wells	Specific Conductance Micromhos/cm (in lab)	Total Dissolved Solids	Total Hardness	Calcuim	Magnasium	Sodium	Bicarbonate	Sulfate	Chloride
Rosebud Spoils										
Average Rosebud Mine	32	3,241	2,986	2291	331	352	195	700	2048	29
Valley Fill Material										
Area A	7	--	2642	1676	238	262	167	593	1465	23
Area B	6	--	2097	1463	182	244	109	678	1062	26
Area C	12	--	2250	1401	162	235	150	515	1233	16
Area D	0	--	--	--	--	--	--	--	--	--
Area E	1	--	3586	2517	463	319	111	452	2246	14
Big Sky	1	5578	5341	3612	540	550	332	--	8.3	168
OPA	14	--	2794	1757	280	241	185	518	1652	16
Aquifer Average*	42	5578++	2568	1658	237	252	152	549	1411	20
Overburden										
Area A	0	--	--	--	--	--	--	--	--	--
Area B	12	--	1672	1053	142	169	135	531	945	8
Area C	4	--	1733	1178	175	180	95	482	896	32
Area D	1	--	404	324	58	43	14	--	71	6
Area E	1	--	520	379	56	58	38	388	126	4
Big Sky	2	878	628	530	83	79	19	404	224	6
OPA	0	--	--	--	--	--	--	--	--	--
Aquifer Average	23	878++	1542	988	136	157	118	527	846	9
Rosebud Coal										
Area A	3	--	1171	799	146	106	72	549	484	5
Area B	16	--	1316	854	128	129	116	628	615	6
Area C	20	--	1688	1045	153	162	118	501	840	16
Area D	3	--	1510	881	169	111	110	451	712	10
Area E	2	--	1641	1087	155	170	103	346	996	12
Big Sky	3	4624	3956	2816	408	433	208	840	2439	23
OPA	4	--	1071	664	124	86	85	338	508	18
Aquifer Average	53	4624++	1627	1076	161	163	123	618	831	10

TABLE 2 (continued)

Aquifer	Number of Wells	Specific Conductance Micromhos/cm (in lab)	Total Dissolved Solids	Total Hardness	Calcuim	Magnasium	Sodium	Bicarbonate	Sulfate	Chloride
Rosebud/McKay Interburden										
Area A	1	--	1840	1030	267	87	238	654	938	9
Area B	2	--	2004	1220	212	169	161	741	931	8
Area C	2	--	2003	1103	186	156	182	560	999	6
Area D	2	--	2830	1430	451	74	317	456	1685	18
Area E	4	--	1600	1233	197	167	105	465	989	11
Big Sky	0	--	--	--	--	--	--	--	--	--
OPA	2	--	1312	618	115.	81	182	318	721	19
Aquifer Average	13	--	1755	1166	208	150	147	506	1000	11
McKay Coal										
Area A	5	--	2402	1104	213	139	320	542	1303	9
Area B	6	--	1530	830	144	114	187	613	771	6
Area C	8	--	1904	750	134	101	306	499	968	7
Area D	5	--	2842	1540	322	179	252	451	1663	12
Area E	2	--	1267	721	138	92	169	566	582	5
Big Sky	5	3127	2945	1774	283	259	278	697	1720	26
OPA	7	--	3185	1998	240	340	244	453	2044	31
Aquifer Average	42	3217++	2102	1152	178	172	233	546	1186	13
Sub-McKay										
Area A	1	--	3210	241	70	16	995	390	1990	14
Area B	0	--	--	--	--	--	--	--	--	--
Area C	3	--	1915	1059	163	159	200	503	1030	7
Area D	1	--	2470	825	181	91	467	373	1500	12
Area E	0	--	--	--	--	--	--	--	--	--
Big Sky	0	--	--	--	--	--	--	--	--	--
OPA	1	--	2210	950	190	116	345	508	1260	13
Aquifer Average	6	--	2183	914	157	127	351	473	1238	9
	(19)		(1706)							

1 All units are milligrams/l unless otherwise noted.
* Complete data base average
\+ Total number of wells with water quality data. Some wells do not have specific locations
++ Is the average for a limited number of wells less than that presented in the aquifer average category

Appendix B

Table 3

Changes in TDS Concentrations (mg/l) in Wells PO-4 and PO-5 in East Fork Armells Creek Alluvium Adjacent to Area A, Rosebud Mine

Well PO-4

Date	Concentration (mg/l)
5/11/75	2,600
11/18/76	2,639
8/3/79	3,830
11/16/79	4,030
5/22/80	4,240
1/22/81	4,310
3/23/81	4,400
7/27/81	3,630

Well PO-5

Date	Concentration (mg/l)
5/16/76	2,000
11/20/79	4,840
1/15/80	5,110

APPENDIX B

TABLE 4

Chemical Data Showing TDS Concentration for McKay Wells S-04, S-08, and WM-127

Well Number	Date	TDS Concentration mg/l	Date	TDS Concentration mg/l
S-04	9/25/73	1,160	7/20/77	5,356
	6/06/74	1,340	3/30/78	9,843
	9/30/75	5,610	2/13/79	5,599
	1/14/76	3,870	8/14/79	6,544
	4/14/76	6,030	2/19/80	5,255
	6/23/76	10,182*		
	8/17/76	7,910	Average	5,725
	10/07/76	6,876		
	4/07/77	4,585		

* Sum of dissolved constituents

Well Number	Date	TDS in mg/l
S-08	9/25/73	2,860
	6/06/74	2,980
	3/30/78	2,960
	10/30/79	3,570
	12/18/79	3,590
WM-127*	5/12/81	7,490
	8/15/81	7,420

* TDS concentration may have been affected by drilling fluid.

APPENDIX B

TABLE 5

SURFACE WATER GAGING STATIONS, COLSTRIP AREA

Station	Owner	Location	Grid-East	Grid-North
CG-01		01N41E08ADAC	48,000.00	43,000.00
CG-02		01N41E02DDAD	64,800.00	45,600.00
CG-03		01N42E19DBCC	72,900.00	62,300.00
CG-04		02N41E33CABA	50,800.00	52,600.00
CG-05		02N41E33DDDD	54,200.00	50,400.00
SW-01	WECO	02N41E28AAD	54,200.00	59,400.00
SW-1A	WECO	02N41E27BCCC	54,700.00	58,200.00
SW-2A	WECO	02N42E31CADC	72,400.00	51,800.00
SW-09	WECO	02N40E33DABC	21,600.00	52,400.00
SW-10	WECO	01N41E07AAA	43,600.00	44,400.00
SW-11	WECO	01N40E11DAD	33,500.00	40,800.00
SW-12	WECO	02N41E16BBA	50,400.00	71,100.00
SW-13	WECO	01N40E07CCC	7,700.00	39,500.00
SW-14	WECO	01N41E03BBBB	54,700.00	50,100.00
SW-15		01N41E09BCAA	50,400.00	43,300.00
SW-17	MBMG	03N41E28CCD	50,300.00	87,800.00
SW-18	WECO	01N40E15BBC	22,900.00	38,300.00
SW-19	MBMG	02N41E34BDB	55,900.00	53,800.00
SW-20		01N41E08BACC	45,300.00	43,700.00
SW-21	MBMG	02N41E09BCB	49,500.00	74,900.00
SW-22	MBMG	02N41E28AABD	53,800.00	60,100.00
SW-23	MBMG	01N41E08ABB	47,100.00	44,600.00
SW-24	WECO	01N41E08ABA	47,600.00	44,700.00
SW-25	WECO	02N41E34CCC	55,500.00	50,700.00
SW-26	WECO	01N41E03ACCB	57,300.00	48,200.00
SW-27	WECO	01N41E03BBBB	54,700.00	49,900.00
SW-30		01N41E07ABCB	41,500.00	44,100.00
SW-35	WECO	01N40E11CCAA	74,400.00	50,800.00
SW-40		02N41E30CDAB	40,800.00	56,700.00
SW-45		02N40E34CBAC	23,700.00	52,300.00
SW-50		01N40E05ABCB	15,000.00	49,500.00
SW-55	WECO	01N40E11CAD		
SW-60	WECO	02N42E32CBDD	67,800.00	51,700.00
SW-61	WECO	01N40E10CDDC	24,900.00	39,500.00
SW-64	WECO	02N41E21DCA	53,000.00	62,000.00
SW-65	WECO	01N41E08AABD	48,400.00	44,400.00
SW-66	WECO	01N41E07ABCB	41,500.00	44,100.00
SW-67	WECO	01N41E03BBBC	54,700.00	49,800.00
SW-68	WECO	01N40E11DADD	33,500.00	40,800.00
SW-70		02N41E14DCA	63,300.00	66,900.00
SW-75		01N40E17BBBA	70,000.00	61,900.00

APPENDIX B

TABLE 6

LIST OF TOTAL DISSOLVED SOLIDS FOR SAMPLES COLLECTED BY THE USGS AT SEVERAL SITES IN THE ARMELLS AND ROSEBUD CREEK BASINS

Stream Discharges for East Fork Armells near Colstrip at Time of Sample Collection is Presented

	Instantaneous Discharge in Cubic Feet Per Second	EF Armells Near Colstrip	Armells Near Forsyth	WF Armells Near Forsyth	Rosebud Near Colstrip	Rosebud Above Pony Creek	Cow Creek Near Colstrip
		(Total Dissolved Solids in Milligrams Per Liter)					
Oct.			2,240		782	832	
Nov.			939	2,510	708	794	
Dec.			3,010	5,660	974	1,030	
Jan. 1975	169	178	3,830	4,520	940	959	
Feb.			1,890	3,810	904	774	
March	21	719	379	383	198	214	
April	2.5	4,110	3,380	4,550	1,000	1,150	
May	6.4	3,310	2,970	3,270	703	790	
June	2.6	3,930	4,030	4,450	632	693	
July			3,410	4,550	669	686	
Aug.			3,840		707	728	
Sept.	2.7	2,060	2,880		709	796	
Oct.	3.7	2,000	3,170	5,710	771	815	
Nov.	1.4	3,370	2,560	4,800	756	899	
Dec.	1.7	3,720	4,100		857	963	
Jan. 1976	1.1	3,690	4,080		887	910	
Feb.	4.3	2,970	2,580	2,730	830	1,040	
March	2.3	3,150	2,780	4,840	738	811	
April	2.4	3,130	4,210	4,850	857	912	
May	5.4	2,860	2,950	4,660	715	830	
June	1.4	3,490	4,190	5,030	728	801	
July	1.6	3,230	3,300		659	627	
Aug.			2,370		758	841	
Sept.			2,330		810	971	
Oct.	1.2	3,890	3,300		839	895	
Nov.	1.5	3,480	3,730		943	1,000	
Dec.	1.4	4,090	4,310		918	996	

APPENDIX B

TABLE 6 (Continued)

	Instantaneous Discharge in Cubic Feet Per Second	EF Armells Near Colstrip	Armells Near Forsyth	WF Armells Near Forsyth	Rosebud Near Colstrip	Rosebud Above Pony Creek	Cow Creek Near Colstrip
		(Total Dissolved Solids in Milligrams Per Liter)					
Jan. 1977	0.73	4,320	3,680		870	940	
Feb.	4.2	3,030	992	1,570	869	704	
March	.22	4,170	3,910	5,540	811	871	
April	.70	4,580	3,520	5,210	555	588	
May	2.0	4,130	2,070	4,450	646	658	
June	.01			2,830	646	700	
July			2,360		741	801	
Aug.					802	897	
Sept.	.51	4,430			895	981	
Oct.	.79	3,890			799		
Nov.						912	
Dec.	.86	4,180			888		
Jan. 1978							
Feb.	.75	4,020			871		
March	1.9	3,850	418		878		
April	2.3	4,000	4,470		782		
May	8.9	2,970	1,680		754		
June	2.5	3,850	4,100		855		
July	.28	3,850					
Aug.			2,710				
Sept.			2,290		843		
Oct.	.51	4,260	4,470		857		
Nov.							
Dec.	1.9	3,950	4,160		953		
Jan. 1979							
Feb.					938		
March	56	985	586				
April	4.5	3,180	3,170		914		
May	3.0	3,880	4,200		753		
June	1.1		4,520		763		
July			2,860		802		

APPENDIX B

TABLE 6 (Concluded)

	Instantaneous Discharge in Cubic Feet Per Second	EF Armells Near Colstrip	Armells Near Forsyth	WF Armells Near Forsyth	Rosebud Near Colstrip	Rosebud Above Pony Creek	Cow Creek Near Colstrip
		(Total Dissolved Solids in Milligrams Per Liter)					
Aug.			2,360		813		
Sept.			2,070		916		
Oct.	.83	4,260	3,570		911		7,900
Nov.							5,495
Dec.	.46	3,880	4,010		936		
Jan. 1980	.49	4,700	5,050		955		
Feb.	1.3	3,580	4,200		924		5,420
March	2.3	3,380	3,010		690		3,110
April	.80	3,970	3,600		806		4,470
May	E.04	4,560	3,570		949		4,610
June	4.1	2,530	3,890		814		3,930
July							
Aug.							
Sept.	.51		2,670				
Oct.	E.05	4,390	1,030		1,010		5,180
Nov.	.28	5,040	1,640				5,510
Dec.					1,000		
Jan. 1981	.69	4,170	4,000		1,090		4,740
Feb.	1.5	3,700	1,860		768		3,860
March	1.1	4,240	3,190		1,150		4,480
April	.84	3,740	3,350		1,010		4,490
May	7.8	1,130	3,360		971		3,050
June							
July					1,050		
Aug.			1,830		1,080		
	MEAN:	3,525	3,031	4,155	833	833	4,732

EF - East Fork
WF - West Fork
E - Estimate

APPENDIX B
TABLE 6-B

SELECTED WATER QUALITY DATA FOR COW CREEK AS REPORTED BY THE U.S. GEOLOGICAL SURVEY(1)

Date (1979-1980)	Specific Conductance (micromhos/cm)	pH	Hardness (as $CaCO_3$)	Calcium	Magnesium	Sodium	Potassium	Sulfate	Chloride	Boron (µg/l)	Iron
October 17	8600	8.2	4300	410	790	850	50	5300	59	3700	40
November 7	6900	8.1	3000	250	570	690	NR	3600	28	2100	40
February 21	5650	8.0	2900	230	560	580	33	3600	30	1900	60
March 20	3690	8.0	1700	230	280	320	14	2000	15	1100	60
April 17	4900	8.1	2600	350	410	450	20	2900	20	1700	50
May 22	5030	8.0	2500	290	440	480	23	3000	24	1900	40
June 19	4500	7.9	2200	280	370	450	24	2400	14	1900	90

All units are milligrams/l unless otherwise noted.

(1) Shields, Ronald R., 1981. Personal Communication.

APPENDIX B

TABLE 7

Chemical Data for Surface Water Stations
In the Vicinity of Area C, Block I
On East Fork Armells and Stocker Creeks

Date	SW-09 TDS Concentration	Date	SW-65 TDS Concentration
7-25-73	2740	5-12-81	4580
6-08-79	3490	5-21-81	3620
8-06-79	3490		
11-29-76	*5180-4880		
6-15-80	*4240-3950		
9-17-80	*5180-4460		
2-03-81	2910		
3-11-81	2690		

*Duplicate sample collected

TABLE 8

Chemical Data for Springs
In the Vicinity of Area C, Block I

CONCENTRATIONS OF MAJOR CONSTITUENTS FOR SPRINGS
(In mg/l)

	TDS	Ca	Mg	Na	HCO_3	SO_4	Cl	N
SP-01	5,310	580	520	220	900	3,090	98	2.10
SP-02	470	77	54	4	360	65	11	12.38
SP-03	4,930	300	430	490	570	2,970	21	0.04
SP-04	3,240	240	350	190	520	1,901	9	0.11
SP-05	5,160	290	610	240	630	3,080	27	0.02

1.0 Hydrologic Budget

A hydrologic budget quantitatively defines inflow and outflow water and changes in storage within a specific hydrologic system.

The major components that will be discussed here are:

- Precipitation (rain and snow)
- The role of vegetation
- Evaporation from surface water sources
- Infiltration rates into the soil
- Soil-water budget
- Groundwater recharge
- Groundwater discharge

Other elements in the hydrologic budget, including surface runoff and groundwater flow, are discussed in Sections 2.2.1 and 2.2.2 of Chapter 2. In each component, both existing conditions and post-mining impacts will be addressed as presented by Western Energy in the Comprehensive Mine Plan.

1.0.1 Precipitation

The Colstrip area is influenced by a continental-type climate, characterized by a wide range of average seasonal temperatures. The average annual precipitation at the Colstrip National Weather Service (NWS) station is 15.8 inches (Bison Engineering, 1981). Annual precipitation may deviate substantially from this long-term average. The standard deviation of precipitation totals for the period 1928 to 1977 is 3.5. The extremes in total annual precipitation for the period 1970 to 1980 were 22.12 inches in 1978 and 7.66 inches in 1980.

Approximately 12 inches of this precipitation falls during the April-to-September growing season, with April, May, and June being the wetest months. Summer precipitation occurs as showers and high-intensity thunderstorms.

From November to April, precipitation falls predominantly as snow. Due to the prevailing westerly winds, the snow typically accumulates on the leeward (east) slopes of north-south-oriented drainages and shallow depressions. These areas are potential sites of groundwater recharge during snowmelt.

Little information is available on variations in precipitation that occur with topography. However, due to the prevailing westerly winds, it is anticipated that more precipitation will occur on the west-facing slopes of the upland areas, particularly in the areas of more extreme relief to the west of the Colstrip study area.

1.0.2 The Role of Vegetation in the Hydrologic Budget

The analysis of the hydrologic budget includes an assessment of the influence of vegetation (through its control over the rate of evapotrans-

piration). Since actual measurements have not been made, results of pan evaporation studies and of calculations using a modified Blaney-Criddle formula (Soil Conservation Service, 1970) have been used as independent methods to calculate potential evaporation and evapotranspiration losses (see Technical Support Document, Section B.3).

The evapotranspiration rate is normally expressed by the potential evapotranspiration. But with a plant cover, this value can be modified with a factor that varies with the type of plant, the stage of plant growth, the development of leaves, and the density of the plant cover. The factors were applied to the measured pan evaporation of 53 inches per year (Technical Support Document, Section B.3), suggesting that potential evapotranspiration from grassland in the Colstrip area is in the range of 36 to 45 inches per year (Dollhopf, 1980; Gray, 1970).

The results of the Blaney-Criddle analysis and the balance of monthly precipitation and evapotranspiration are presented in Table 9. Both this method and the pan evaporation study illustrate that evapotranspiration is highly significant in the water balance of the area.

An additional, although less significant, role of vegetation is the interception of precipitation and subsequent water loss by evaporation. No actual measurements of this mechanism exist; however, the interception of rainfall by grasses in the Colstrip area has been estimated using a relationship developed by Horton (1919). However, this empirical relationship is appropriate only for individual storm events and is therefore difficult to apply on an average basis. Even so, the total yearly value for the interception of rainfall was estimated to be approximately 0.5 inch per year.

1.0.3 Evaporation from Surface Water Sources

Evaporation from surface waters, such as ponds and reservoirs, can be estimated from Class A pan evaporation data. The results of various studies of pan evaporation data are discussed in the Technical Support Document, Section B.3. These studies indicate that surface water evaporation can range from 33 to 53 inches per year.

1.0.4 Infiltration

Infiltration rates for general soils groups at the Rosebud Mine have been estimated from soil surveys conducted by Western Energy as part of the mine permit applications. Infiltration rates for most soils range from slow (0.06 inch per hour) to moderately rapid (6 inches per hour).

1.0.5 Soil Moisture Budget and Deep Percolation

A major consideration in the water budget of the Colstrip area is whether any of the surface moisture received from precipitation will reach the groundwater table. An analysis of properties of the major soil groups

TABLE 9

MONTHLY PRECIPITATION AND ESTIMATED POTENTIAL EVAPOTRANSPIRATION BALANCE (BLANEY - CRIDDLE) AT COLSTRIP, MONTANA

Month	Precipitation(1) (Inches)	Potential(2) Evapotranspiration (Inches)	Balance (Inches)
January	0.56	--	+0.56
February	0.56	--	+0.56
March	0.74	--	+0.74
April	1.86	--	+1.86
May	2.47	-3.29	- .82
June	3.31	-4.83	-1.52
July	1.18	-6.70	-5.52
August	1.39	-5.69	-4.30
September	1.38	-3.16	-1.78
October	1.04	-1.53	-0.49
November	0.67	--	+0.67
December	0.63	--	+0.63
Annual Total	+15.79	-25.20	-9.41

(1) Monthly Mean Precipitation: 1941 - 1970

(2) Calculated using Modified Blaney-Criddle Formula (Soil Conservation Service, 1970)

at the Rosebud Mine indicates that little water infiltrates to the groundwater (see Technical Support Document, Section B.3). The soils with the greatest potential for recharge appear to be clinker residual soils (Technical Support Document, Section B.4) and soils in areas where water can accumulate (such as small depressions, ponds, and channel bottoms).

1.0.6 Groundwater Recharge

Water in ephemeral stream channels in the Colstrip area usually flows in well-defined peaks. The peak flows often last only a few hours in the summer and are separated by long dry periods. As a consequence, groundwater recharge is low, both in channels and on slopes. Infiltration (or transmission loss*) into the groundwater reservoir formed by the valley fill material is controlled by hydraulic gradient,* hydraulic conductivity of the aquifer, and hydraulic conductivity of the streambed.

No direct observations of infiltration or transmission losses of streamflow are available in the Colstrip area. However, measurements in other semiarid areas indicate that the volumes lost to valley fill aquifers may be large. Keepel and Renard (1962), for example, observed that 50 percent of the maximum stream discharge was lost and total flow volume is reduced by 35 percent over a 10-mile stream reach. Turner et al. (1943) stated that infiltration losses of 75 percent over 15 to 25 miles were common. In perennial channels, a study of 57 flood events on 18 rivers in the Great Plains revealed an average loss of 40 percent (and maximum loss of 75 percent) on channel lengths of 50 miles.

The importance of transmission losses is related to the inflow volume, at least up to some level of discharge, because of the characteristics of the channel cross section. Where the width/depth ratio of a channel is large (that is, where a small increase in flow depth will yield large increases in stream width), the consequent increase in surface area covered by water will increase transmission loss. Many streams in the Colstrip area have incised, active channels, bordered by a shallow, high-flow channels and flood plains. In these cases, increased losses may jump sharply as flow spreads onto the flood plain.

An estimate of recharge to the valley fill aquifer at a point approximately 3 miles north of Colstrip was made using a two-dimensional model of the system at steady state (Technical Support Document, Section B.1). Input considerations included rainfall, evapotranspiration, transmission losses, and tributary inflow. This analysis indicates that the amount of recharge to the valley fill aquifer is approximately 195 acre-feet per year.

1.0.7 Groundwater Discharge

Groundwater discharge to the East Fork Armells Creek drainage system (and specifically to its valley fill aquifer) takes the form of springs, seeps, and upward leakage from the Rosebud aquifer. A value was estimated using a two-dimensional steady state computer model of the valley fill

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*See Glossary at end of Hydrology section in Chapter 2.

system (Technical Support Document, Section B.1). This model indicates that the total amount of groundwater discharge to the system is approximately 130 acre-feet per year.

1.0.8 Hydrologic Budget Analysis

The hydrologic budget of the water transmitted in the valley fill aquifer of East Fork Armells Creek is based on Ertec's (a consulting firm) two-dimensional steady state computer model (Technical Support Document, Section B.1). Potential groundwater contributions to Pony and Cow Creek valley fill were derived utilizing Ertec's three-dimensional steady state computer model. The inflow to the system consists of discharge from the Rosebud aquifer, seepage from the Montana Power Company's surge pond, recharge, and tributary inflow. Outflow from the system includes downward leakage, evapotranspiration losses, and the amount of underflow through the valley fill material out of the system.

Considering these parameters, the hydrologic budget for a location on East Fork Armells Creek approximately three miles north of Colstrip is as follows:

Inflow	
Discharge from the Rosebud Aquifer	130 acre-feet/year
Surge Pond Seepage	175 acre-feet/year
Fly Ash Pond	24 acre-feet/year
Recharge and Tributary Inflow	195 acre-feet/year
	524 acre-feet/year
Outflow	
Downward Leakage and Evapotranspiration	375 acre-feet/year
East Fork Armells Creek Underflow	149 acre-feet/year
	524 acre-feet/year

Total inflow = Total outflow

No other data, measured or estimated, are available for inflow or outflow in the system (Hydrometrics, 1981). A similar water balance conducted for Stocker Creek indicated that no impacts would occur (see Section 3.2 in Chapter 2).

It is difficult to accurately quantify seasonal gains and losses from the Cow Creek drainage. However, on a sustained basis, one can assume that most inflow occurs from groundwater discharge, while most losses occur via evapotranspiration in those areas of Cow Creek alluvium assumed to be subirrigated.

The potential evapotranspration calculated for grassland in the study area was used to calculate the estimated losses in subirrigated areas. It is assumed that throughout the growing season a subirrigated area plant community has all of the available water it needs. That total loss (annually) would be 25.2 inches/year (see Table B3-27 Technical Support Data). The total combined present groundwater discharge to both North and

South Fork Cow Creek is approximately 15,630 cubic feet per day or 131 acre-feet per year. This value represents the total groundwater discharge along Cow Creek from the headwaters to its confluence with Rosebud Creek. The contribution from the South Fork of Cow Creek at the confluence of the North and South Fork is approximately 1190 acre-feet per day or 10 acre-feet per year. The volumes were obtained by examining the discharges from each bedrock aquifer as calculated from the steady state calibration of the three-dimensional flow model. Potential losses due to subirrigation (all occurring along North Fork Cow Creek) total 319 acre-feet per year, or 13,895,640 cubic feet per year. Since this value obviously exceeds the amount of water contributed by groundwater discharge, one or more of a number of factors are involved:

1. There are contributions, such as infiltration from precipitation on alluvium, which make a significant and unaccounted for contribution to alluvial groundwater.

2. The area identified as being subirrigated is, in fact, smaller than as mapped.

3. The actual uptake by plants is less than that calculated.

Because of a lack of field-verified data, a water budget cannot be presented for Stocker Creek. Even so, discharge from groundwater aquifers is expected to be the only major factor that would change directly from mining. A decrease in groundwater discharge may result in a corresponding decrease in water levels and therefore a decrease in the amount of water available for evapotranspiration. In subirrigated areas where wetland vegetation exists only marginally, a decrease in water levels could cause loss of vegetation. The present groundwater discharge to Stocker Creek, which originates mainly from the McKay and Sub-McKay aquifers, is 181 acre-feet per year.

Difficulty exists with the use of synthetic water balances, particularly for the semiarid West. Generally, any water balance arrived at without direct measurement is only a gross approximation. In the semiarid West, a standard water balance usually results in zero net infiltration values. A water balance does not include the anomolous conditions which may allow for rapid infiltration, for example, without evapotranspiration losses.

Appendix B

Table 10

Surface Water Flow and Quality for Pony Creek

Station	Location	Date Measuring Device Installed	Date Measured	Mean Daily Flow (gpm)	Peak Flow (gpm)	TDS (mg/l)
Pony Creek, CG-3	02N41E24DDA	12/80		Flow unmeasurable		
Pony Creek, CG-80	02N41E24DDA	10/82				
Pony Creek, SW-80	02N41E24DDA	12/80	2/11/82	-	282	
			2/12/83	273	448	
			2/13/82	170	291	
			2/14/82	76	264	
			2/15/82	130	242	
			2/16/82	76	188	
			2/18/82	-	-	84
Spring, SP24				No data available		
Spring, SP25				No data available		

Appendix B

Table 11

Alluvial Groundwater Quality in Pony and Spring Creeks

Site	Location	Date well Constructed	Date Measured	TDS (mg/l)
Pony Creek, WA-112	02N41E24DDA	9/79	12/05/79	1,860
			5/6/82	3,290
Spring Creek, WA-175	02N41E12CCD	8/82	-	-
WA-176	02N41E12DCD	8/82	-	-

Appendix B

Table 12

Surface Water Flow and Quality for Spring Creek

Station	Location	Date Measuring Device Installed	Date Measured	Mean Daily Fl (gpm)	Peak Flow (gpm)	TDS (mg/l)
Spring Creek, CG-70	02N41E4DCA	11/82		No flow recorded		
Spring Creek, SW-20	02N41EDCA	9/81	2/15/82	-	2,330	
			3/11/82	9	61	
			6/4/82	2	32	
			6/5/82	13	198	
			6/6/82	42	129	
			7/18/82	-	-	70
			8/23/82	-	-	140
Pond, PO-021	02N41E14DDCB	8/23/82				1,910
Spring, Sp-22				No data avaialble		
Spring, Sp-23				No data available		

APPENDIX C

APPENDIX C

PROPOSED REVEGETATION APPROACH
ROSEBUD MINE AREA

PHASE I - SUPPLEMENTAL GRASS, FORBS, AND SHRUB MIXTURE

This seed mixture will be broadcast onto prepared seedbeds in all reclaimed areas during the first optimal seeding period following soil placement.

Common Name/Scientific Name	Percent of Mix (PLS)
Side-oats grama/*Bouteloua curtipendula*	28
Needle-and-Thread/*Stipa comata*	15
Indian ricegrass/*Oryzopsis hymenoides*	10
Fourwing saltbush/*Atriplex canescens*	5
Winterfat/*Ceratoides lanata*	10
Blue grama/*Bouteloua gracilis*	10
Lewis flax/*Linum lewisii*	5
Prairie coneflower/*Ratibida columnifera*	5
Western yarrow/*Achillea millefoluim lanulosa*	5
Purple prairie clover/*Petalostemon purpureum*	2.5
White prairie clover/*Petalostemon candidum*	2.5
Cicer milkvetch (Lutana)/*Astragalus cicer*	1
Sainfoin (ESKE)/*Onobrychis viciaefolia*	1

Seeding rates 13 lbs./acre of pure live seed (PLS), with an additional 5 lbs. PLS/acre of sterile wintergraze.

APPENDIX C

PHASE II - REVEGETATION AREA SEED MIXTURES

These mixtures will be drill seeded 1 to 3 years after the first phase supplemental mixture is planted. Seeding rates will be 20 pounds of pure live seed (PLS) per acre, with an additional 5 pounds PLS of the sterile hydrid wintergraze included to increase cover. Areas have been delineated based upon topographic position on the postmined topography.

Wetland/Riparian Mixture

Common Name/Scientific Name	Percent of Mix (PLS)
Switchgrass/*Panicum virgatum*	50
Prairie cordgrass/*Spartina pectinata*	30
Alkali bluegrass/*Poa juncifolia*	10
Wetland sedges/*Canex* spp.	10

Lowland/Drainage Seed Mixture

Common Name/Scientific Name	Percent of Mix (PLS)
Rosana western wheatgrass/*Agropyron smithii*	30
Slender wheatgrass/*A. trachycaulum*	20
Thickspike wheatgrass/*A. dasystachyum*	10
Mountain brome/*Bromus marginatus*	10
Kentucky bluegrass/*Poa pratensis*	10
Canada bluegrass/*P. compressa*	10
Canada wildrye/*Elymus canadensis*	10

Uplands Grass Mixture

Common Name/Scientific Name	Percent of Mix (PLS)
Rosana western wheatgrass/*Agropyron smithii*	40
Critana thickspike wheatgrass/*A. dasystachyum*	25
Slender wheatgrass/*A. trachycaulum*	5
Green needlegrass/*Stipa viridula*	30

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Steep Uplands Grass Mixture

Common Name/Scientific Name	Percent of Mix (PLS)
Green needlegrass/*Stipa viridula*	50
Rosana western wheatgrass/*Agropyron smithii*	15
Critana thickspike wheatgrass/*A. dasystachyum*	30
Slender wheatgrass/*A. trachycaulum*	5

Conifer Zone Grass Mixture - 61 acres

Common Name/Scientific Name	Percent of Mix (PLS)
Green needlegrass/*Stipa viridula*	40
Side-oats grama/*Bouteloua curtipendula*	40
Indian ricegrass/*Oryzopsis hymenoides*	10
Rosana western wheatgrass/*Agropyron smithii*	5
Critana thickspike wheatgrass/*A. dasystachyum*	5

ADDITIONAL SEEDING

In any of the areas in which sandy soils may occur, e.g., the Uplands, Steep Uplands, and Conifer Zone, an additional "patch seeding" approach will be used. Sandy soil materials of one acre or less in size will be seeded with the following mixture of warm season grasses at a rate of 40 lbs./acre PLS:

Big bluestem/*Andropogon gerardii*
Sand bluestem/*A. hallii*
Little bluesteam/*Schizachyrium scoparium*
Prairie sandreed/*Calamovilfa longifolia*

APPENDIX C

Shrubs will be established by planting tubelings grown in a greenhouse from locally collected seed. Srubs to be established in this way include:

Big sagebrush/*Artemisia tridentata*
Silver sagebrush/*Artemisiacana*
Skunkbush sumas/*Rhus triolbata*
Rubber rabbitbrush/*Chrysothamnus nauseosus*

Additional shrubs and trees will be transplanted by utilizing a tree spade and transplanting mature stock from potentially disturbed areas onto regraded areas. Any of the numerous shrub and tree species occurring in mining areas may be handled in this way.

APPENDIX D

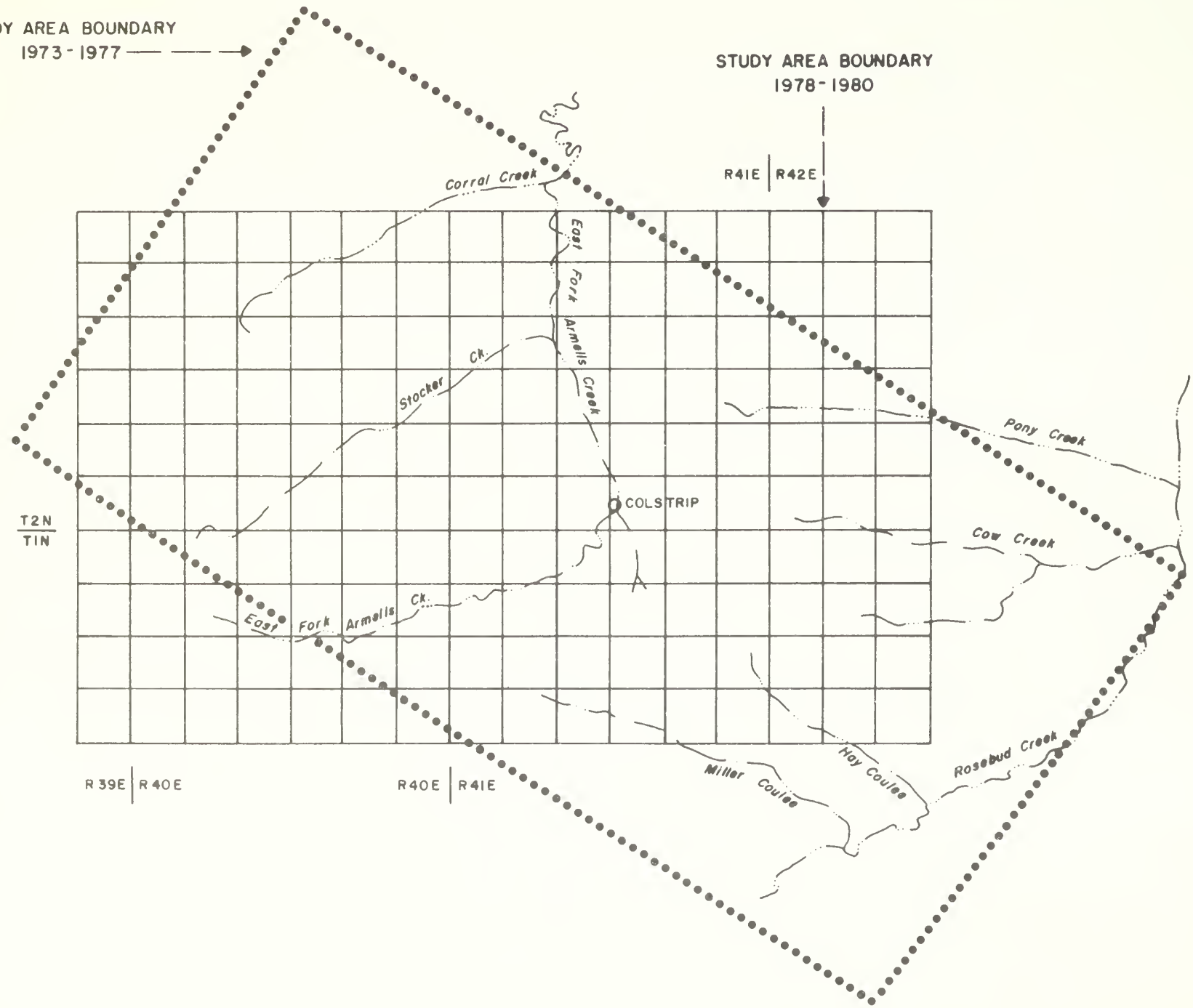

FIGURE 1 MAP OF ROSEBUD MINE WILDLIFE STUDY AREA

TABLE 1

SUMMARY OF PRONGHORN ANTELOPE AERIAL SURVEYS AND RESULTS
WILDLIFE STUDY AREA 1974 - 1980

Year	Number of Flights	Total Air Hours	Obser-vations Per Hour	Fawns Per 100 Does	Percent Herd Composition		
					Male	Female	Young
1974	14	24.1	37.5	40	25	54	21
1975	24	37.9	29.6	20	20	67	13
1976	23	41.7	21.7	18	18	69	13
1977	20	31.1	25.8	31	12	67	21
1978*	23	31.5	25.9	34	18	61	21
1979*	17	31.5	15.6	49	15	57	28
1980*	21	33.2	24.1	59	12	55	33

* Study area was reduced in 1978 from 200 sq. mi. to 160 sq. mi., of which approximately 80 percent was included in the original 200 sq. mi. study area.

TABLE 2

SUMMARY OF MULE DEER AERIAL SURVEYS AND RESULTS

WILDLIFE STUDY AREA

Year	Number of Flights	Total Air Hours	Obser-vations Per Hour	Fawns Per 100 Does	Percent Herd Composition		
					Antlered	Antlerless	Young
1974	10	24.1	31.9	68	13	52	35
1975	23	37.9	22.4	70	14	50	36
1976	23	41.7	21.1	62	12	54	34
1977	19	31.1	19.2	57	11	57	32
1978*	22	31.5	12.7	64	15	52	33
1979*	24	31.5	14.6	78	12	49	39
1980*	30	33.2	15.2	56	15	54	30

* Study area was reduced in 1978 from 200 sq. mi. to 160 sq. mi., of which approximately 80 percent was included in the original 200 sq. mi. study area.

TABLE 3

MAMMALS EXPECTED IN SOUTHEASTERN MONTANA*

Common Name (Scientific Name)	Colstrip[1]	Special Concern[2]	Thompson[3]
Insectivora:			
Masked shrew (*Sorex cinereus*)	X		
Hayden shrew (*Sorex haydeni*)			X
Preble's shrew (*Sorex preblei*)			X
Merriam's shrew (*Sorex merriami*)		X	
Chiroptera:			
Little brown myotis (*Myotis lucifugus*)	X		
Long-eared myotis (*Myotis evotis*)			X
Small-footed myotis (*Myotis leibii*)	X		X
Long-legged myotis (*Myotis volans*)			
Silver-haired bat (*Lasionycteris noctivagans*)			
Big brown bat (*Eptesicus fuscus*)	X		X
Hoary bat (*Lasiurus cinereus*)			X
Townsend's big-eared bat (*Plecotus townsendii*)		X	X
Lagomorpha:			
Nuttall's cottontail (*Sylvilagus nuttallii*)	X		
Desert cottontail (*Sylvilagus audubonii*)	X		X
Snowshoe hare (*Lepus americanus*)			
White-tailed jackrabbit (*Lepus townsendii*)	X		X
Rodentia:			
Least chipmunk (*Eutamias minimus*)	X		X
Yellow-bellied marmot (*Marmota flaviventris*)	X		X
Richardson's ground squirrel (*Spermophilus richardsonii*)	X		
Thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*)	X		X

* Nomenclature follows Jones, et al, 1979; distribution information from Hall, 1981; Burt and Grossenheider, 1964; Flath, 1981; and Thompson, 1982.

1 Denotes species seen during the Rosebud Mine Wildlife Studies (Ecological Consulting Service, 1972, 1973, 1974, 1975; ECON, 1976a, 1977a, 1978, 1979; Western Energy, 1980).

2 Denotes species listed by Flath, 1981.

3 Denotes species listed as known from latilongs 33 or 43 by Thompson (1982).

TABLE 3 (Continued)

Common Name (Scientific Name)	Colstrip[1]	Special Concern[2]	Thompson[3]
Black-tailed prairie dog (*Cynomys ludovicianus*)	X	X	X
Fox squirrel (*Sciurus niger*)			X
Red squirrel (*Tamiasciurus hudsonicus*)			X
Northern pocket gopher (*Thomomys talpoides*)	X		X
Olive-backed pocket mouse (*Perognathus fasciatus*)			X
Ord's kangaroo rat (*Dipodomys ordii*)	X		X
Beaver (*Castor canadensis*)	X		X
Western harvest mouse (*Reithrodontomys megalotis*)	X		X
Deer mouse (*Peromyscus maniculatus*)	X		X
White-footed mouse (*Peromyscus leucopus*)	X		X
Northern grasshopper mouse (*Onchomys leucogaster*)	X		X
Bushy-tailed wood rat (*Neotoma cinerea*)			X
Meadow vole (*Microtus pennsylvanicus*)	X		X
Long-tailed vole (*Microtus longicaudus*)			X
Prairie vole (*Microtus ochrogaster*)	X		X
Sagebrush vole (*Lagurus curtatus*)			
Muskrat (*Ondatra zibethicus*)	X		X
House mouse (*Mus musculus*)	X		X
Meadow-jumping mouse (*Zapus hudsonius*)	X		X
Western jumping mouse (*Zapus princeps*)			
Porcupine (*Erethizon dorsatum*)	X		X
Carnivora:			
Coyote (*Canis latrans*)	X		X
Red fox (*Vulpes vulpes*)	X		X
Swift fox (*Vulpes velox*)		X	X
Black bear (*Ursus americanus*)			X
Raccoon (*Procyon lotor*)	X		X
Ermine (*Mustela erminea*)			X
Long-tailed weasel (*Mustela frenata*)	X		X
Black-footed ferret (*Mustela nigripes*)**		X	
Mink (*Mustela vison*)			X
Badger (*Taxidea taxus*)	X		X

** Endangered species (Federal Register, 1980)

TABLE 3 (Continued)

Common Name (Scientific Name)	Colstrip[1]	Special Concern[2]	Thompson[3]
Striped skunk (*Mephitis mephitis*)	X		X
River otter (*Lutra canadensis*)			X
Mountain lion (*Felis concolor*)			X
Bobcat (*Felis rufus*)	X		X
Artiodactyla:			
Elk (*Cervus elaphus*)	X		X
Mule deer (*Odocoileus hemionus*)	X		X
White-tailed deer (*Odocoileus virginianus*)	X		X
Pronghorn (*Antilocapra americana*)	X		X
Mountain sheep (*Ovis canadensis*)			X

TABLE 4

BIRDS EXPECTED IN SOUTHEASTERN MONTANA*

Common Name (Scientific Name)	Colstrip[1]	Special Concern[2]	Skaar[3]
Gaviiformes:			
Common loon (*Gavia immer*)	X		X
Podicipediformes:			
Horned grebe (*Podiceps auritus*)	X		X
Eared grebe (*Podiceps caspicus*)	X		X
Western grebe (*Aechmophorus occidentalis*)	X		X
Pied-billed grebe (*Podilymbus podiceps*)	X		X
Pelecaniformes:			
White pelican (*Pelecanus erythrorhynchos*)	X		X
Double-crested cormorant (*Phalacrocorax auritus*)			X
Anseriformes:			
Whistling swan (*Olor columbianus*)			
Canada goose (*Branta canadensis*)	X		X
Snow goose (*Chen hyperborea*)			
Mallard (*Anas platyrhynchos*)	X		X
Black duck (*Anas rubripes*)			X
Gadwall (*Anas strepera*)	X		X
Pintail (*Anas acuta*)	X		X
Green-winged teal (*Anas carolinensis*)	X		X
Blue-winged teal (*Anas discors*)	X		X
Cinnamon teal (*Anas cyanoptera*)	X		X
American widgeon (*Mareca americana*)	X		X
Shoveler (*Spatula clypeata*)	X		X
Wood duck (*Aix sponsa*)			X
Redhead (*Aythya americana*)	X		X
Ring-necked duck (*Aythya collaris*)	X		X
Canvasback (*Aythya valisineria*)	X		X
Lesser scaup (*Aythya affinis*)	X		X
Common goldeneye (*Bucephala clangula*)	X		X
Bufflehead (*Bucephala albeola*)	X		
Ruddy duck (*Oxyura jamaicensis*)	X		X
Common merganser (*Mergus merganser*)			X

* Distribution information from Robbins et al., 1966.

1 Denotes species seen during Rosebud Mine Wildlife Studies.

2 Denotes species listed by Flath, 1981.

3 Denotes species listed by Skaar, 1975, as present in latilongs 34 or 43.

TABLE 4 (Continued)

Common Name (Scientific Name)	Colstrip	Special Concern	Skaar
Falconiformes:			
Turkey vulture (Cathartes aura)			X
Goshawk (Accipiter gentilis)		X	
Sharp-shinned hawk (Accipiter striatus)			X
Cooper's hawk (Accipiter cooperii)	X	X	X
Red-tailed hawk (Buteo jamaicensis)	X		X
Swainson's hawk (Buteo swainsoni)	X		X
Rough-legged hawk (Buteo lagopus)	X		X
Ferruginous hawk (Buteo regalis)	X	X	X
Golden eagle (Aquila chrysaetos)	X	X	X
Bald eagle (Haliaeetus leucocephalus)**	X	X	X
Northern harrier (Circus cyaneus)	X		X
Osprey (Pandion haliaetus)		X	X
Prairie falcon (Falco mexicanus)	X	X	X
Peregrine falcon (Falco peregrinus)**		X	
Merlin (Falco columbarius)	X	X	
American kestrel (Falco sparverius)	X		X
Galliformes:			
Ruffed grouse (Bonasa umbellus)			X
Sharp-tailed grouse (Pedioecetes phasianellus)	X		X
Sage grouse (Centrocercus urophasianus)	X		X
Ring-necked pheasant (Phasianus colchicus)	X		X
Chukar (Alectoris graeca)			X
Hungarian (Gray) Partridge (Perdix perdix)	X		X
Turkey (Meleagris gallopavo)	X		X
Ciconiformes:			
Great blue heron (Ardea herodias)	X		X
American bittern (Botaurus lentiginosus)			X
Gruiformes:			
Whooping crane (Grus americana)**			X
Sandhill crane (Grus canadensis)			X
Virginia rail (Rallus limicola)			
Sora (Porzana carolina)			X
American coot (Fulica americana)	X		X
Charadriiformes:			
Killdeer (Charadrius vociferus)	X		X
Mountain plover (Eupoda montana)		X	X
Black-bellied plover (Squatarola squatarola)			
Common snipe (Capella gallinago)	X		X

** Endangered species (Federal Register, 1980)

TABLE 4 (Continued)

Common Name (Scientific Name)	Colstrip	Special Concern	Skaar
Long-billed curlew (Numenius americanus)		X	X
Upland plover (Bartramia longicauda)	X		X
Spotted sandpiper (Actitis macularia)	X		X
Solitary sandpiper (Tringa solitaria)	X		X
Willet (Catoptrophorus semipalmatus)	X		X
Greater yellowlegs (Totanus melanoleucus)	X		X
Lesser yellowlegs (Totanus flavipes)			X
Least sandpiper (Erolia minutilla)			X
Long-billed dowitcher (Limnodromus scolopaceus)	X		X
Semipalmated sandpiper (Calidris pusilla)			X
Western sandpiper (Erunetes mauri)			X
Marbled godwit (Limosa fedoa)			
American avocet (Recurvirostra americana)			X
Wilson's phalarope (Steganopus tricolor)	X		X
Northern phalarope (Lobipes lobatus)			X
Herring gull (Larus argentatus)			X
California gull (Larus californicus)			X
Ring-billed gull (Larus delawarensis)	X		X
Franklin's gull (Larus pipixcan)			X
Common tern (Sterna hirundo)	X		
Black tern (Chlidonias niger)	X		
Columbiformes:			
Rock dove (Columba livia)			X
Mourning dove (Zenaida macroura)	X		X
Cuculiformes:			
Yellow-billed cuckoo (Coccyzus americanus)			X
Black-billed cuckoo (Coccyzus erythropthalmus)	X		X
Strigiformes:			
Barn owl (Tyto alba)			X
Screech owl (Otus asio)			
Great horned owl (Bubo virginianus)	X		X
Pygmy owl (Glaucidium gnoma)		X	
Burrowing owl (Athene cunicularia)	X	X	
Barred owl (Strix varia)		X	
Long-eared owl (Asio otus)	X	X	
Short-eared owl (Asio flammeus)	X		X
Saw-whet owl (Aegolius acadicus)		X	X

TABLE 4 (Continued)

Common Name (Scientific Name)	Colstrip	Special Concern	Skaar
Caprimulgiformes:			
Poor-will (*Phalaenoptilus nuttallii*)			X
Common nighthawk (*Chordeiles minor*)	X		X
Apodiformes:			
Chimney swift (*Chaetura pelagica*)			X
White-throated swift (*Aeronautes saxatalis*)	X		X
Coraciiformes:			
Belted kingfisher (*Megaceryle alcyon*)	X		X
Piciformes:			
Common flicker (*Colaptes auratus*)	X		X
Red-headed woodpecker (*Melanerpes erythrocephalus*)	X		X
Lewis' woodpecker (*Asyndesmus lewis*)			X
Yellow-bellied sapsucker (*Sphyrapicus varius*)			
Hairy woodpecker (*Dendrocopos villosus*)			X
Downy woodpecker (*Dendrocopos pubescens*)	X		X
Black-backed three-toed woodpecker (*Picoides arcticus*)			X
Passeriformes:			
Eastern kingbird (*Tyrannus tyrannus*)	X		X
Western kingbird (*Tyrannus verticalis*)	X		X
Cassin's kingbird (*Tyrannus vociferans*)			X
Say's phoebe (*Sayornis saya*)	X		X
Least flycatcher (*Empidonax minimus*)			X
Dusky flycatcher (*Empidonax oberholseri*)	X		X
Western wood pewee (*Contopus sordidulus*)	X		X
Olive-sided flycatcher (*Nuttalornis borealis*)			?
Horned lark (*Eremophila alpestris*)	X		X
Violet-green swallow (*Tachycineta thalassina*)	X		X
Tree swallow (*Iridoprocne bicolor*)			X
Bank swallow (*Riparia riparia*)	X		X
Rough-winged swallow (*Stelgidopteryx ruficollis*)	X		X
Barn swallow (*Hirundo rustica*)	X		X
Cliff swallow (*Petrochelidon pyrrhonota*)	X		X
Purple martin (*Progne subis*)	X		X
Blue jay (*Cyanocitta cristata*)			X
Steller's jay (*Cyanocitta stelleri*)			
Black-billed magpie (*Pica pica*)	X		X

TABLE 4 (Continued)

Common Name (Scientific Name)	Colstrip	Special Concern	Skaar
Common raven (Corvus corax)			X
Common crow (Corvus brachyrhynchos)	X		X
Pinyon jay (Gymnorhinus cyanocephala)	X		X
Clark's nutcracker (Nucifraga columbiana)			
Black-capped chickadee (Parus atricapillus)	X		X
White-breasted nuthatch (Sitta carolinensis)	X		X
Red-breasted nuthatch (Sitta canadensis)	X		
Brown creeper (Certhia familiaris)			X
Dipper (Cinclus mexicanus)			
House wren (Troglodytes aedon)	X		X
Long-billed marsh wren (Telmatodytes palustris)			X
Canyon wren (Catherpes mexicanus)			X
Rock wren (Salpinctes obsoletus)	X		X
Mockingbird (Mimus polyglottos)	X		
Catbird (Dumetella carolinensis)	X		X
Brown thrasher (Toxostoma rufum)	X		X
Sage thrasher (Oreoscoptes montanus)			X
American robin (Turdus migratorius)	X		X
Swainson's thrush (Catharus ustulatus)			X
Gray-cheeked thrush (Catharus minimus)			X
Veery (Catharus fuscescens)			X
Townsend's solitaire (Myadestes townsendi)	X		X
Eastern bluebird (Sialia sialis)	X	X	X
Western bluebird (Sialia mexicana)	X	X	?
Mountain bluebird (Sialia currucoides)	X		X
Golden-crowned kinglet (Regulus satrapa)			
Ruby-crowned kinglet (Regulus calendula)			
Water pipit (Anthus spinoletta)			
Sprague's pipit (Anthus spragueii)			
Bohemian waxwing (Bombycilla garrula)	X		X
Cedar waxwing (Bombycilla cedrorum)	X		X
Northern shrike (Lanius excubitor)	X		X
Loggerhead shrike (Lanius ludovicianus)	X		X
Starling (Sturnus vulgaris)	X		X
Solitary vireo (Vireo solitarius)			X
Red-eyed vireo (Vireo olivaceus)	X		X
Warbling vireo (Vireo gilvus)			X
Black and white warbler (Mniotilta varia)			X
Orange-crowned warbler (Vermivora celata)			X
Yellow warbler (Dendroica petechia)	X		X
Yellow-rumped warbler (Dendroica auduboni)			X
Ovenbird (Seiurus aurocapillus)			X
Northern waterthrush (Seiurus novaboracensis)			X
Yellowthroat (Geothlypis trichas)	X		X

TABLE 4 (Continued)

Common Name (Scientific Name)	Colstrip	Special Concern	Skaar
Yellow-breasted chat (*Icteria virens*)			X
American redstart (*Setophaga ruticilla*)	X		X
House sparrow (*Passer domesticus*)	X		X
Bobolink (*Dolichonyx oryzivorus*)		X	
Western meadowlark (*Sturnella neglecta*)	X		X
Yellow-headed blackbird (*Xanthocephalus xanthocephalus*)	X		X
Red-winged blackbird (*Agelaius phoeniceus*)	X		X
Northern oriole (*Icterus galbula*)	X		X
Brewer's blackbird (*Euphagus cyanocephalus*)	X		X
Common grackle (*Quiscalis quiscula*)	X		X
Brown-headed cowbird (*Molothrus ater*)	X		X
Western tanager (*Piranga ludoviciana*)	X		X
Black-headed grosbeak (*Pheucticus melanocephalus*)			X
Lazuli bunting (*Passerina amoena*)			X
Dickcissel (*Spiza americana*)		X	X
Evening grosbeak (*Hesperiphona vespertina*)	X		X
Cassin's finch (*Carpodacus cassinii*)			?
Gray-crowned rosy finch (*Leucosticte tephrocotis*)	X		X
Black rosy finch (*Leucosticte atrata*)			X
Pine siskin (*Spinus pinus*)	X		X
American goldfinch (*Spinus tristis*)	X		X
Red crossbill (*Loxia curvirostra*)	X		X
Rufous-sided towhee (*Pipilo erythrophthalmus*)	X		X
Lark bunting (*Calamospiza melanocorys*)	X		X
Savannah sparrow (*Passerculus sandwichensis*)	X		X
Grasshopper sparrow (*Ammodramus savannarum*)	X		X
Baird's sparrow (*Ammodramus bairdii*)			
Vesper sparrow (*Pooecetes gramineus*)	X		X
Lark sparrow (*Chondestes grammacus*)	X		X
Dark-eyed junco (*Junco hyemalis*)	X		X
Tree sparrow (*Spizella arborea*)			X
Chipping sparrow (*Spizella passerina*)	X		X
Clay-colored sparrow (*Spizella pallida*)			X
Brewer's sparrow (*Spizella breweri*)		X	X
Harris' sparrow (*Zonotrichia querula*)			X
White-crowned sparrow (*Zonotrichia leucophrys*)	X		X
Lincoln's sparrow (*Melospiza lincolnii*)			X
Song sparrow (*Melospiza melodia*)	X		X
Snow bunting (*Plectrophenax nivalis*)	X		X
McCown's longspur (*Rhynocophanes mccownii*)	X		X
Chestnut-collared longspur (*Calcarius ornatus*)			X

TABLE 5

REPTILES AND AMPHIBIANS EXPECTED IN SOUTHEASTERN MONTANA*

Common Name (Scientific Name)	Colstrip[1]	Special Concern[2]	Thompson[3]
Tiger salamander (*Ambystoma tigrinum*)	X		X
Plains spadefoot (*Scaphiopus bombifrons*)			X
Western toad (*Bufo boreas*)			?
Rocky Mountain toad (*Bufo woodhousei*)			X
Great Plains toad (*Bufo cognatus*)			X
Dakota toad (*Bufo hemiophrys*)			X
Boreal chorus frog (*Pseudacris triseriata*)			?
Leopard frog (*Rana pipiens*)	X		X
Bullfrog (*Rana catesbiana*)			X
Snapping turtle (*Chelydra serpentina*)	X	X	X
Painted turtle (*Chrysemys picta*)	X		X
Spiny softshell (*Trionyx spiniferus*)		X	X
Sagebrush lizard (*Sceloporus graciosus*)	X		X
Eastern short-horned lizard (*Phrynosoma douglassi*)			X
Plains hognose snake (*Heterodon nasicus*)	X	X	X
Yellow-bellied racer (*Coluber constrictor*)	X		X
Bull snake (*Pituophis melanoleucus*)	X		X
Milk snake (*Lampropeltis triangulum*)			X
Common garter snake (*Thamnophis sirtalis*)	X		X
Plains garter snake (*Thamnophis radix*)			
Wandering garter snake (*Thamnophis elegans*)			X
Prairie rattlesnake (*Crotalus viridis*)	X		X

* Information from Stebbens (1966) maps and text.

1 Denotes species seen in the Rosebud Mine Wildlife Studies.

2 Denotes species listed by Flath, 1981.

3 Denotes species listed from latilong 33 or 43 by Thompson, 1981.

TABLE 6

FISHES OCCURRING IN THE YELLOWSTONE DRAINAGE, EASTERN MONTANA[1]

Common Name (Scientific Name)	Game Species	Species of Special Interest Or Concern[2]
Paddlefish (*Polyodon spathula*)		X
Pallid Sturgeon (*Scaphirhynchus albus*)		X
Finescale Dace (*Phoxinus neogaeus*)		X
Sturgeon Chub (*Hybopis gelida*)		X
Blue Sucker (*Cycleptus elongatus*)		X
Shovelnose Sturgeon (*Scaphirhynchus platorynchus*)	X	
Brook Trout (*Salvelinus fontinalis*)	X	
Rainbow Trout (*Salmo gairdneri*)	X	
Brown Trout (*S. trutta*)	X	
Northern Pike (*Esox lucius*)	X	
Channel Catfish (*Ictalurus punctatus*)	X	
Burbot (*Lota lota*)	X	
Largemouth Bass (*Micropterus salmoides*)	X	
Yellow Perch (*Perca flavescens*)	X	
Sauger (*Stizostedion canadense*)	X	
Walleye (*S. vitreum*)	X	
Goldeye (*Hiodon alosoides*)		
Goldfish (*Carassius auratus*)		
Carp (*Cyprinus carpio*)		
Golden Shiner (*Notemigonus crysoleucas*)		
Pearl Dace (*Semotilus margarita*)		
Creek Chub (*S. atromaculatus*)		
Flathead Chub (*Hybopis gracilis*)		
Lake Chub (*Couseius plumbeus*)		
Emerald Shiner (*Notropis atherinoides*)		
Sand Shiner (*N. stramineus*)		
Brassy Minnow (*Hybognathus hankinsoni*)		
Plains Minnow (*H. placitus*)		
Silvery Minnow (*H. nuchalis*)		
Fathead Minnow (*Pimephales promelas*)		
Longnose Dace (*Rhinichthys cataractae*)		
River Carpsucker (*Carpoides carpio*)		
Shorthead Redhorse (*Moxostoma macrolepidotum*)		
Longnose Sucker (*Catostomus catostomus*)		
White Sucker (*Catostomus commersoni*)		
Mountain Sucker (*C. platyrhynchus*)		
Black Bullhead (*Ictalurus melas*)		
Stonecat (*Noturus flavus*)		
Plains Killifish (*Fundulus kansae*)		
Brook Stickleback (*Culasea inconstans*)		
Green Sunfish (*Lepomis cyanellus*)		
Pumpkinseed (*L. gibbosus*)		

TABLE 6 (continued)

FISHES OCCURRING IN THE YELLOWSTONE DRAINAGE, EASTERN MONTANA[1]

Common Name (Scientific Name)	Game Species	Species of Special Interest Or Concern
Bluegill (*L. macrochirus*)		
White Crappie (*Pomoxis annularis*)		
Black Crappie (*P. nigromaculatus*)		
Freshwater Drum (*Aplodinotus grunniens*)		
Yellow Perch (*Stizostedion canadense*)		

[1]Brown, C.J.D. 1971. Fishes of Montana. Big Sky Books, Montana State University, Bozeman, Montana.

[2]Flath, D.L. 1979. Nongame Species of Special Interest of Concern, Montana Department of Fish and Game.

APPENDIX E

Table 1

PERSONAL INCOME, BY MAJOR SOURCE
ROSEBUD COUNTY AND MONTANA, 1970 and 1979
(In Thousands of 1980 Dollars)

	Rosebud County				Montana			
	1970		1979		1970		1979	
	1980 Dollars	Percentage of Total	1980 Dollars	Percentage of Total	1980 Dollars	Percentage of Total	1980 Dollars	Percentage of Total
Total Personal Income	$33,201	100.0	$67,282	100.0	$ 4,697,355	100.0	$ 6,787,331	100.0
Labor and Proprietors' income	26,181	78.9	56,412	83.9	3,661,398	77.9	4,930,531	72.7
Farm	6,221	18.7	1,830	2.7	533,570	11.4	326,483	4.8
Agricultural services, other	306	.9	301	.5	13,011	.3	23,148	.4
Mining	1,286	3.9	14,085	20.9	125,642	2.7	208,172	3.1
Construction	710	2.1	7,301	10.9	256,081	5.5	408,330	6.0
Manufacturing	2,177	6.6	2,421	3.6	397,178	8.5	537,739	7.9
Transportation, Public Utilities	3,528	10.6	6,124	9.1	335,892	7.2	548,160	8.1
Trade	2,564	7.7	4,066	6.1	626,110	13.3	903,224	13.3
Finance, insurance, and real estate	278	.8	896	1.3	136,134	2.9	238,870	3.5
Services	4,086	12.3	10,598	15.8	482,594	10.3	774,948	11.4
Federal government	1,929	5.8	2,752	4.1	305,926	6.5	341,728	5.0
State and local government	3,096	9.3	6,038	9.0	449,260	9.6	619,729	9.1
Dividends, interest, and rents	5,253	15.8	10,064	15.0	696,787	14.8	1,289,958	19.0
Transfer payments	4,332	13.1	7,353	10.9	519,436	11.1	889,869	13.1
Social security contributions and residence adjustments	-2,564	-7.7	-6,547	-9.7	-180,266	-3.8	-323,027	-4.8

Source: Bureau of Economic Analysis, Dept. of Commerce, 1981.

Table 2

PERSONAL INCOME, BY BROAD CATEGORIES,
ROSEBUD COUNTY, 1970 to 1979
(In Thousands of 1980 Dollars)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Total personal income	$33,201	$31,784	$36,698	$52,345	$51,750	$72,037	$63,611	$60,348	$71,642	$67,282
Labor and proprietors' income	26,181	25,228	30,823	46,055	44,893	78,453	61,614	53,086	62,269	56,412
Farm	6,221	4,128	6,609	13,955	6,983	2,587	-804	-701	8,820	1,830
Agricultural services, other	306	223	259	186	200	215	419	318	311	301
Mining	1,286	1,601	2,279	7,202	7,505	11,562	13,760	13,283	14,320	14,085
Construction	710	436	947	1,653	5,177	37,590	19,820	11,308	7,957	7,301
Manufacturing	2,177	2,395	2,389	1,871	1,909	1,675	1,271	752	1,385	2,421
Transportation, Public Utilities	3,528	3,380	3,850	4,157	4,401	4,223	4,975	5,435	5,439	6,124
Trade	2,564	2,697	3,025	3,280	3,484	4,191	4,117	3,619	3,717	4,066
Finance, insurance and real estate	278	355	488	513	564	544	827	846	859	896
Services	4,086	4,592	5,215	6,840	7,706	8,049	9,428	10,153	10,856	10,598
Federal government	1,929	2,161	2,343	2,439	2,672	3,049	2,501	2,634	2,744	2,752
State and local government	3,096	3,260	3,419	3,959	4,292	4,768	5,300	5,439	5,861	6,038
Dividends, interest, and rents	5,253	4,837	4,448	5,595	6,587	6,820	7,610	8,713	9,546	10,064
Transfer payments	4,332	4,477	4,515	5,050	5,449	6,173	7,010	7,100	7,119	7,353
Social security contributions and residence adjustments	-2,564	-2,758	-3,088	-4,355	-5,179	-19,409	-12,623	-8,551	-7,292	-6,547

Source: Bureau of Economic Analysis, Dept. of Commerce, 1981.

Table 3

PER CAPITA PERSONAL INCOME,
ROSEBUD COUNTY AND MONTANA, 1970 to 1979
($1980)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Rosebud County	$5,493	$5,204	$5,217	$7,633	$6,613	$7,463	$6,434	$6,213	$7,555	$6,948
Montana	$6,803	$6,533	$7,257	$7,982	$7,776	$7,563	$7,745	$7,747	$8,503	$8,601
Percentage of Montana	80.8	79.7	78.8	95.6	85.1	98.7	83.1	80.2	88.9	80.8

Source: Bureau of Economic Analysis, Dept. of Commerce, 1981.

Table 4

EMPLOYMENT, BY INDUSTRY,
ROSEBUD COUNTY AND MONTANA, 1970 and 1979

	Rosebud County			
	1970		1979	
	Number	Percentage of Total	Number	Percentage of Total
Total	2,466	100.0	4,472	100.0
Agriculture	704	28.3	587	13.1
Mining	43	1.7	434	9.7
Construction	29	1.2	282	6.3
Transportation, communication, and public utilities	184	7.5	369	8.3
Manufacturing	214	8.7	163	3.6
Trade	217	8.8	432	9.7
Finance, insurance, and real estate	19	.8	65	1.5
Services	391	15.9	1,051	23.5
Federal government	107	4.4	163	3.6
State and local government	330	13.4	557	12.5
Nonfarm proprietors	228	9.2	369	8.3
	Montana			
Total	279,091	100.0	373,409	100.0
Agriculture	39,882	14.3	35,017	9.4
Mining	6,547	2.4	7,737	2.1
Construction	11,180	4.0	15,608	4.2
Transportation, communication, and public utilities	17,308	6.2	23,265	4.9
Manufacturing	23,963	8.6	28,907	7.8
Trade	48,575	17.4	73,566	19.7
Finance, insurance, and real estate	7,832	2.8	13,261	3.6
Services	38,458	13.8	60,594	16.2
Federal government	18,253	6.6	23,696	6.4
State and local government	41,376	14.7	52.759	14.1
Nonfarm proprietors	25,717	9.2	38,999	10.5

Note: Details may not add due to rounding.

Source: Western Analysis, Inc.

Table 5

EMPLOYMENT, BY INDUSTRY,
ROSEBUD COUNTY, 1970 to 1979

	1970	1971	1972	1973	1974	1975	1976	1977[1]	1978[1]	1979[1]
Total Employment	2,466	2,709	2,871	3,235	3,600	4,978	4,415	4,088	4,263	4,472
Agriculture	704	710	696	681	692	658	610	562	534	587
Mining	43	79	104	269	283	392	416	365	372	434
Construction	29	25	39	76	180	1,354	656	345	267	282
TPUC	184	181	192	193	212	210	226	313	349	369
Manufacturing	214	230	265	192	180	160	185	86	124	163
Trade	217	242	268	312	347	412	425	367	400	432
FIRE	19	26	37	43	49	50	61	59	61	65
Services	391	520	570	727	827	809	905	1,002	1,108	1,051
Federal government	107	110	118	116	137	154	132	142	152	163
State and local government	330	353	367	393	419	441	455	480	530	557
Nonfarm proprietors	228	233	215	233	274	338	344	367	366	369
Unemployment rate	3.1	3.0	3.2	3.2	3.6	3.3	5.8	6.9	5.9	5.0

[1]Adjustments were made to REIS data for the years 1977 through 1979 to reflect employment figures supplied by Montana Power Company, Western Energy Company, Peabody Coal Company and Long Construction.

Source: Bureau of Economic Analysis, Dept. of Commerce, 1981.
Montana Department of Labor and Industry, various years.
Western Analysis, Inc.

Table 6

BASIC AND DERIVATIVE EMPLOYMENT
ROSEBUD COUNTY, 1970 and 1979

	1970	1979	Change 1970-1979
Basic industries	1,306	2,380	1,074
Agriculture	704	587	-117
Mining	43	434	391
Construction (part)	11	238	227
Manufacturing (part	201	145	-56
Trade (part) and tourism[1]	49	64	15
Transportation, public utilities and communications	109	312	203
Government (part)	41	63	22
Other basic industries	148	537	389
Derivative industries	1,159	2,092	933
Construction (part)	18	44	26
Manufacturing (part)	13	18	5
Trade (part)	179	386	207
Finance, insurance, and real estate	19	65	46
Services (part)	244	506	262
Government (part)	396	657	261
Other derivative industries	290	416	126

[1] Includes hotels and motels plus estimated retail trade employment serving nonresidents.

Source: Western Analysis, Inc.

Table 7

POPULATION AND RETAIL TRADE: SELECTED COUNTIES AND THE STATE OF MONTANA, 1977

	Population	Sales (000's)	Sales Per Capita	Sales as % of Income	Trade Loss/Gain
Big Horn	10,700	$25,847	$2,416	48	-19
Carbon	8,100	16,766	2,070	41	-19
Custer	13,100	52,377	3,998	62	+3
Musselshell	4,500	9,830	2,184	41	-35
Powder River	2,500	6,061	2,424	46	-18
Rosebud	9,700	18,552	1,913	36	-4
Stillwater	5,400	10,571	1,958	40	-38
Yellowstone	101,500	513,875	5,063	72	+12
MONTANA	766,000	2,847,500	3,717	60	

Source: Bureau of the Census, Department of Commerce
Bureau of Economic Analysis, Department of Commerce
Western Analysis, Inc.

Table 8

RETAIL TRADE AND PERSONAL INCOME, SELECTED COUNTIES
AND THE STATE OF MONTANA, (%), 1977

	All Retail Trade (Personal Income)	Gasoline (Personal Income)	Eating & Drinking (Personal Income)	Grocery (Personal Income)	Apparel and Accessory (Personal Income)	Furniture, Furnishings, Equipment (Personal Income)
Bighorn	48	8.7	5.4	13.8	2.1	0.6
Carbon	41	4.0	6.8	10.4	2.0	(D)
Custer	62	8.2	6.7	13.8	4.8	1.5
Musselshell	41	7.2	5.7	(D)	(D)	1.7
Powder River	46	(D)	5.6	(D)	(D)	(D)
Rosebud	36	4.6	4.7	(D)	(D)	(D)
Stillwater	40	8.1	5.4	9.8	(D)	0.4
Yellowstone	72	5.0	5.9	12.6	3.6	3.7
MONTANA	60	5.7	5.8	12.1	2.9	2.6

Note: (D) denotes data withheld due to disclosure requirements.

Source: Bureau of the Census, Department of Commerce
Western Analysis, Inc.

Table 9

COLSTRIP BUSINESS INVENTORY, DECEMBER 1981

Location	Business Name/Type	Gross Interior Floor Area (approximate square feet)
1. Colstrip Commercial Mall[1]	U.S. Post Office	1,968
2. Colstrip Commercial Mall[1]	Tillet Insurance Company	890
3. Colstrip Commercial Mall[1]	Security Bank of Colstrip	4,510
4. Colstrip Commercial Mall[1]	Buttons and Bows/fabric store	714
5. Colstrip Commercial Mall[1]	G & C Appliances/major appliance sales/service	357
6. Colstrip Commercial Mall[1]	Rosebud County Press/local newspaper office	357
7. Colstrip Commercial Mall[1]	Rosebud County Medical Clinic	2,300
8. Colstrip Commercial Mall[1]	Dental-optometry-mental health clinics	2,242
9. Colstrip Commercial Mall[1]	Crown Room/barber shop	293
10. Colstrip Commercial Mall[1]	Guys and Dolls/hairstyling	355
11. Colstrip Commercial Mall[1]	The Bears Den/Gift and Novelty Sales	540
12. Colstrip Commercial Mall[1]	Laundromat	1,080
13. Colstrip Commercial Mall[1]	Taylor's Ace/hardware and pharmacy	6,600

Table 9

COLSTRIP BUSINESS INVENTORY, DECEMBER 1981
(Continued)

Location Address	Lot No.	Business Name	Type of Business	Gross Interior Floor Area (approx. sq. ft.)	Lot Area (approx. sq. ft.)
14. 110 Willow Avenue	Block 31, Lot 1	Town Pump/ Town Pantry	self-service gas, convenience grocery	2,600	46,469 (includes Snack Shack)
15. 106 Willow Avenue	Block 31, Lot 1	Snack Shack	carry-out foods	1,700	leased/Town Pump
16. 3 Cherry Ave.	Block 21, Lot 1	Jerry's IGA	supermarket	13,500	31,225
17. 430 Water St.	Block 30, Lot 2	a) State Liquor Store	packaged liquor sales	1,500	9,278
		b) space for lease[2]		1,200	(includes vacant store)
18. 134 Cherry	Block 47, Lot 1	a) Knudsen's Ranch and Sportswear	general clothing	3,600	20,000
		b) space for lease[3]		3,600	(includes vacant store)
20. Spruce/Cherry Street	Block 21, Lot 2	Valley Motor Supply	automobile parts (retail)	6,300	21,780
21. Colstrip Industrial Park	Tract 1 & Block 1, Lot 1	Childers' Garage	auto/truck parts, (retail/wholesale) & wrecker service	6,300	88,000

Table 9

COLSTRIP BUSINESS INVENTORY, DECEMBER 1981
(Continued)

Address	Location Lot No.	Business Name	Type of Business	Gross Interior Floor Area (approx. sq. ft.)	Lot Area (approx. sq. ft.)
22. Colstrip Industrial Park	Block 1, Lot 7	Colstrip Tires, Inc.	tire sales	2,400	48,250
23. West side Highway 39/Castle Rock Lake Drive		Colstrip Food & Beverage Depot	restaurant and bar	4,000	leased/Sunlight Development Co.
24. West side Highway 39/north		B & R Village	cafe and bar	2,500	N/A
25. Mall	Block 24, Lot 1	Fort Union Inn	motel	20 rooms	29,692

[1]Mall Statistics: 1) Total leasable floor area (net) = 22,300 sq. ft.
2) Lease rates range from $6.50 to $9.25 per square foot, plus $1.50 to $1.75 for common area maintenance.

[2]Knudsen's Ranch and Sportwear recently moved to a new and larger building.

[3]New building, space recently made available.

Source: Wirth/CSSA & Mountain West Research, 1982
Western Analysis, Inc.

Table 10

ADDITIONAL RETAIL ESTABLISHMENTS NEEDED IN 1985[1]

Type of Establishment	Existing Establishments	Additional Number Needed	Comments
Gas Stations			
(gas and service)	none	1-2	could also sell auto accessories & used cars
(gas only)	Town Pantry Town Pump	2-3	
Eating Places			
(first class with lounge)	no first class or family type restaurants by definition	1	
(family type)	Snack Shack (carry out)	2-5	
Grocery Stores			
(full-scale supermarkets)	Jerry's IGA	1-2	
(convenience type)	Town Pantry	2-4	could be associated with gas station
Bars	B & R Colstrip Food & Beverage Depot	1-2	
General Clothing Store	Knudsen's Ranch & Sportswear	1[2]	
Real Estate Office	none	1	
Insurance Agent	Tillett Insurance Agency	1	
Professional Space	Medical Clinics	1-2	would serve needs of accountants, lawyers, or other professionals who might operate in Colstrip on a part-time basis

Table 10

ADDITIONAL RETAIL ESTABLISHMENTS NEEDED IN 1985[1]
(Continued)

Type of Establishment	Existing Establishments	Additional Number Needed	Comments
Car Wash (self service)	none	1	4-6 bays operating 24 hours a day
Motion Picture Theatre (twin)	none	1	
Bowling Alley with Lounge	none	1	
Catalog Store	none	1	independent agent selling the merchandise of a major department store
Jewelry Store	none	1	offering complete selection & watch repair
Shoe Repair Shop	none	1	
Radio & TV Repair Store (retail)	G & C Appliances Colstrip Enterprizes (both sales only)	1	
Building Material Store (retail)	none	1[2]	
Book Store	none	1[2]	could offer paperbacks, magazines, newspapers, stationary, tobacco products, & candy
Motel	Fort Union Inn (20 rooms)	1[2]	

[1]May also be viable prior to 1985.
[2]Possible or marginal viability indicated.

Source: Wirth/CSSA & Mountain West Research, 1982

Table 11

PERCENT CHANGE IN POPULATION, COLSTRIP, FORSYTH, ROSEBUD COUNTY, AND MONTANA, 1970-1980

	1970 Population	1980 Population	Percent Change
Colstrip	250[1]	3,258[1]	1,303%
Forsyth	1,873	2,553	36%
Rosebud County	6,032	11,379[1]	89%
Montana	694,409	786,690	13%

[1]Estimated

Source: Bureau of the Census, Dept. of Commerce.
Western Analysis, Inc.

Table 12

SELECTED DEMOGRAPHIC CHARACTERISTICS,
ROSEBUD COUNTY (RC) AND MONTANA (MT)
1950-1980

	1950		1960		1970		1980	
	RC	MT	RC	MT	RC	MT	RC	MT
Total population	6,570	591,024	6,187	674,767	6,032	694,409	9,899	786,690
Percent change	--	--	-5.8	14.2	-2.6	2.9	64.1	13.3
Percent non-white	20.4	3.2	21.9	3.6	30.3	4.5	24.6	5.9
Male population	3,560	309,423	3,201	343,743	3,051	347,005	5,076	392,065
Percent total male	54.2	52.4	51.7	51.0	50.6	50.0	51.3	49.9
Female population	3,010	281,60	2,986	331,024	2,981	347,404	14,823	394,065
Percent total female	45.8	47.6	48.3	49.0	49.4	50.0	48.7	50.1
Median age:								
Male	30.7	30.7	27.3	28.0	27.0	26.6	25.7	28.4
Female	28.9	29.9	25.8	27.1	25.4	27.6	24.8	29.6
Families	1,570	145,775	1,394	165,777	1,395	170,093	2,383	205,290
Percent change families	--	--	-11.3	13.7	0.0	2.6	70.8	20.7
Households	1,773	175,614	1,749	202,240	1,817	217,304	3,188	283,742
Percent change households	--	--	-1.4	15.2	3.9	7.4	75.5	30.6

Source: Bureau of the Census, Dept. of Commerce, various years.
Western Analysis, Inc.

Table 13

POPULATION, BY AGE AND SEX,
ROSEBUD COUNTY, FORSYTH, AND COLSTRIP
1970 AND 1980

	Colstrip						Forsyth						Rosebud County					
	Male		Female		Total		Male		Female		Total		Male		Female		Total	
Age	1970	1980	1970	1980	1970	1980	1970	1980	1970	1980	1970	1980	1970	1980	1970	1980	1970	1980
5	12	196	13	192	25	388	64	133	55	125	119	258	298	645	311	669	609	1,314
5-9	14	223	14	203	28	426	74	89	82	112	156	201	339	582	352	560	691	1,142
10-14	15	165	14	170	29	335	118	97	78	96	196	193	372	561	333	532	705	1,093
15-19	12	142	11	103	23	245	80	112	79	93	159	205	276	560	271	497	547	1,057
20-24	7	123	9	167	16	290	49	115	56	107	105	222	165	493	210	539	375	1,032
25-34	15	383	14	348	29	731	91	218	89	214	179	432	353	1,022	342	1,005	695	2,027
35-44	14	245	14	187	28	432	97	147	90	123	187	270	337	699	309	564	646	1,263
45-54	14	121	13	103	27	224	124	116	112	125	236	241	346	821	307	456	653	977
55-64	11	95	10	51	21	146	106	112	92	110	198	222	261	453	236	349	497	302
65 +	12	26	12	15	24	41	169	117	169	192	338	309	304	300	310	372	614	672
Total	126	1,719	124	1,539	250	3,258	972	1,256	901	1,287	1,873	2,553	3,051	5,836	2,981	5,543	6,032	11,379

Source: Bureau of the Census, Dept. of Commerce
Western Analysis, Inc.

Table 14

POPULATION BY AGE, AS A PERCENT OF TOTAL POPULATION
COLSTRIP, FORSYTH, AND ROSEBUD COUNTY, MONTANA
1970 and 1980

Percent of Total Population

	Colstrip		Forsyth		Rosebud County	
Age	1970	1980	1970	1980	1970	1980
5	10.0%	11.9%	6.4%	10.1%	10.1%	11.6%
5-9	11.2	13.1	8.3	7.9	11.5	10.0
10-14	11.6	10.3	10.5	7.6	11.7	9.6
15-19	9.2	7.5	8.5	8.0	9.1	9.3
20-24	6.4	8.9	5.6	8.7	6.2	9.1
25-34	11.6	22.4	9.6	16.9	11.5	17.8
35-44	11.2	13.3	10.0	10.6	10.7	11.1
45-54	10.8	6.9	12.6	9.4	10.8	8.6
55-64	8.4	4.5	10.6	8.7	8.2	7.1
65+	9.6	1.3	18.0	12.1	10.2	5.9

Source: Bureau of the Census, Dept. of Commerce.
Western Analysis, Inc.

Table 15

SELECTED CHARACTERISTICS OF THE
ASHLAND-LAME DEER-BIRNEY POPULATION[1]
1960-1980

	Population		Percent			
	Total	% Change	Male	Female	White	65 & Over
1960	2,076	17.4	51.0	49.0	36.0	6.1
1970	2,635	26.9	49.6	50.4	31.3	5.1
1980	3,215	22.0	49.9	50.1	26.6	4.1

[1]Census enumeration districts were changed in 1980. The 1980 data presented are the sum of the data from the Ashland and Northern Cheyenne Divisions.

Source: Bureau of the Census, Dept. of Commerce, various years. Western Analysis, Inc.

Table 16

MARITAL STATUS OF PERSONS AGED FOURTEEN AND OLDER
ROSEBUD COUNTY (RC) AND MONTANA (MT)
1950-1980

	1950		1960		1970		1980	
Age Group	RC	MT	RC	MT	RC	MT	RC	MT
Single								
Number	1,206	98,950	953	101,194	1,067	128,817	1,637	141,908
Percent	18.4	16.8	15.4	15.0	17.7	18.6	16.5	18.8
Married								
Number	2,966	283,195	2,663	310,023	2,637	314,533	4,335	367,063
Percent	45.2	47.9	43.1	46.0	43.7	45.3	43.8	46.7
Divorced/ separated								
Number	--	16,355	168	19,261	179	21,757	502	43,983
Percent	--	2.8	2.7	2.9	3.0	3.1	5.1	5.6
Widowed								
Number	--	31,190	317	31,847	323	36,815	338	40,504
Percent	--	5.3	5.1	4.7	5.4	5.3	3.4	5.2

Source: Bureau of the Census, Dept. of Commerce, various years.
Western Analysis, Inc.

Table 17

BASELINE EMPLOYMENT AND POPULATION FORECAST
ROSEBUD COUNTY, FORSYTH, AND COLSTRIP, 1980-2010

	1980	1981	1982	1983	1984	1985	1990	1995	2000	2010
Agriculture	582	577	572	567	562	557	549	542	525	502
Mining	436	451	470	587	671	677	671	677	674	694
Construction	1,040	1,702	3,187	2,910	1,150	281	147	147	147	147
Manufacturing	145	185	193	195	198	200	212	222	233	249
TPUC	362	400	511	588	676	702	702	702	702	702
Trade	47	48	50	51	52	53	56	58	62	68
FIRE	0	0	0	0	0	0	0	0	0	0
Services	562	579	596	614	632	651	710	755	828	940
Government	64	64	84	101	85	67	70	70	70	70
Nonfarm proprietors	10	11	11	11	11	12	13	13	14	16
Total Basic	3,248	4,017	5,674	5,624	4,037	3,200	3,130	3,186	3,255	3,388
Total Nonbasic	2,153	2,249	2,386	2,544	2,692	2,740	2,760	2,847	2,978	3,208
Total Employment	5,401	6,266	8,060	8,168	6,729	5,940	5,890	6,033	6,233	6,596
Rosebud Population	11,379	12,945	16,245	16,419	13,724	12,191	11,842	12,073	12,245	12,959
Net Migration	1,421	1,502	3,070	-118	-2,980	-1,751	-1,185	-349	-403	NA
Colstrip Population	3,258	4,493	7,150	7,259	5,112	3,883	3,643	3,689	3,697	3,853
Forsyth Population	2,553	2,620	2,819	2,840	2,670	2,575	2,542	2,599	2,650	2,823
Rosebud Per Capita Income (1980$)	7,986	8,442	9,133	9,290	8,778	8,529	9,903	11,174	13,380	17,441

Source: Bureau of Economic Analysis, Department of Commerce
Western Energy Company
Western Analysis, Inc.

Table 18

PROJECTIONS OF BASELINE PERSONAL INCOME
ROSEBUD COUNTY, SELECTED YEARS, 1980-2010
(In Thousands of 1980 Dollars)

	1980	1981	1982	1983	1984	1985	1990	1995	2000	2010
Agriculture	4,610	4,780	4,955	5,138	5,327	5,522	6,448	7,070	7,628	9,022
Mining	12,842	13,044	13,098	16,272	19,558	20,409	23,839	28,353	40,960	63,032
Construction	24,295	39,918	75,902	71,474	28,862	8,015	4,836	5,391	6,023	7,472
Non-Agriculture	36,187	39,214	43,528	47,770	51,826	53,010	62,155	71,297	83,659	111,227
Property & Transfer	18,005	18,618	19,756	21,021	21,766	22,706	26,432	30,090	35,263	48,173
Social Insurance Contribution	-5,058	-6,292	-8,930	-9,140	-6,864	-5,688	-6,436	-7,301	-9,689	-12,907
TOTAL	90,881	109,282	148,368	152,535	120,475	103,974	117,274	134,900	163,844	226,019
Population	11,379	12,945	16,245	16,419	13,724	12,191	11,842	12,073	12,245	12,959
Per Capita	7,986	8,442	9,133	9,290	8,778	8,529	9,903	11,174	13,380	17,441

Source: Bureau of Economic Analysis, Department of Commerce
Western Energy Company
Western Analysis, Inc.

Table 19

LIVE BIRTH RATES, CRUDE DEATH RATES,
AND RATES OF NATURAL INCREASE,
ROSEBUD COUNTY (RC) AND MONTANA (MT)
1971-1980

	Live Birth Rate[1]		Crude Death Rate[2]		Natural Increase[3]	
Year	RC	MT	RC	MT	RC	MT
1971	29.7	17.8	11.6	9.7	18.1	7.9
1972	22.5	15.9	9.7	9.6	12.8	6.3
1973	24.2	15.8	11.4	9.4	12.8	6.3
1974	24.9	16.7	10.4	8.9	14.5	7.8
1975	27.1	16.1	6.5	8.7	20.6	7.4
1976	22.8	16.7	6.9	8.9	15.9	7.8
1977	22.1	17.5	7.8	8.4	14.3	9.1
1978	22.3	17.3	6.6	8.3	15.7	9.0
1979	23.5	17.9	7.4	8.2	16.1	9.7
1980	21.4	18.1	7.4	8.4	14.0	9.6

[1] Live birth rate = $\frac{\text{Live births}}{\text{Population}} \times 1{,}000$

[2] Crude death rate = $\frac{\text{Total deaths}}{\text{Population}} \times 1{,}000$

[3] Rate of natural increase = $\frac{\text{Live births} - \text{total deaths}}{\text{Population}} \times 1{,}000$

Source: Montana Department of Health and Environmental Sciences, various years.
Western Analysis, Inc.

Table 20

CRUDE DEATH RATES FOR SELECTED CAUSES OF DEATH[1]
ROSEBUD COUNTY (RC) AND MONTANA (MT)
1971-1980

	Accidental Deaths		Cerebrovascular Deaths		Cancer Deaths		Heart Disease Deaths	
Year	RC	MT	RC	MT	RC	MT	RC	MT
1971	1.66	0.86	1.00	1.12	1.82	1.48	2.49	3.30
1972	0.64	0.89	0.64	1.04	1.11	1.57	1.43	3.20
1973	1.36	0.84	0.46	0.97	0.76	1.45	2.73	3.15
1974	1.04	0.76	1.04	0.91	2.34	1.53	2.47	2.99
1975	1.63	0.78	0.35	0.88	0.70	1.48	1.51	2.91
1976	0.91	0.77	0.41	0.84	1.21	1.58	2.12	2.88
1977	1.81	0.75	0.10	0.75	1.05	1.55	1.91	2.81
1978	0.83	0.72	0.52	0.72	0.83	1.58	1.65	2.76
1979	1.44	0.76	0.52	0.75	0.62	1.58	1.65	2.93
1980	1.11	0.72	0.30	0.71	0.61	1.64	2.43	2.96

[1] $\text{Death rate} = \frac{\text{Deaths by cause}}{\text{Population}} \times 1{,}000$

Source: Montana Department of Health and Environmental Sciences, various years.
Western Analysis, Inc.

Table 21

INCIDENCE AND RATE OF INFANT MORTALITY
ROSEBUD COUNTY AND MONTANA
1971-1980

	Incidence		Rate[1]	
	Rosebud County	Montana	Rosebud County	Montana
1971	2	267	11.2	21.6
1972	3	225	21.2	19.7
1973	6	222	37.5	19.5
1974	1	202	5.3	16.5
1975	0	187	0.0	15.5
1976	3	209	13.3	16.6
1977	4	183	17.3	13.8
1978	6	155	27.8	11.4
1979	6	151	26.4	10.7
1980	2	176	9.5	12.4

[1] $\text{Rate} = \frac{\text{Number of infant deaths}}{\text{Live births}} \times 1{,}000$

Source: Montana Department of Health and Environmental Sciences, various years.
Western Analysis, Inc.

Table 22

COMPARATIVE INCIDENCE OF THE SEVEN MAJOR CRIMES,
ROSEBUD COUNTY (RC) AND MONTANA (MT), 1971-1980

Year	Homicide		Rape		Robbery		Aggravated Assault		Burglary		Larceny/ Theft		Motor Vehicle Theft	
	RC	MT	RC	MT	RC	MT	RC	MT	RC	MT	RC	MT	RC	MT
1971	0	30	1	99	1	204	6	637	28	4,638	56	15,412	7	1,572
1972	0	32	1	78	1	239	7	745	28	5,092	51	15,297	8	1,778
1973	1	48	5	128	0	291	51	1,172	26	5,501	62	15,754	10	1,687
1974	3	44	7	107	1	296	62	1,038	30	6,387	88	19,339	9	2,116
1975	1	46	3	132	0	347	92	1,461	38	7,240	104	21,417	7	2,530
1976	0	41	5	124	0	283	63	1,137	86	6,665	119	21,560	25	2,327
1977	5	40	6	137	7	295	77	1,436	33	6,350	83	21,149	8	2,413
1978	1	37	3	146	0	259	29	1,519	27	6,270	69	20,563	11	2,452
1979	3	41	8	183	0	261	28	1,361	26	6,326	107	24,304	14	2,404
1980	1	30	0	166	0	257	38	1,243	57	7,027	173	25,749	14	2,319

Source: Montana Department of Justice
Western Analysis, Inc.

Table 23

COMPARATIVE RATES OF THE SEVEN MAJOR CRIMES,
ROSEBUD COUNTY (RC) AND MONTANA (MT), 1971-1980

Year	Homicide		Rape		Robbery		Aggravated Assault		Burglary		Larceny/ Theft		Motor Vehicle Theft	
	RC	MT	RC	MT	RC	MT	RC	MT	RC	MT	RC	MT	RC	MT
1971	0.0	4.3	16.6	14.3	16.6	29.4	99.5	91.7	464.2	667.9	928.4	2219.4	116.0	226.4
1972	0.0	4.4	15.9	10.8	15.9	33.2	111.1	103.6	444.4	708.2	809.5	2127.5	127.0	247.3
1973	15.2	6.7	75.8	17.8	0.0	40.4	772.7	162.6	393.9	763.0	939.4	2185.0	151.5	234.0
1974	39.0	6.0	90.9	14.6	13.0	40.3	805.2	141.2	389.6	869.0	1142.9	2631.2	116.9	287.9
1975	11.6	6.1	34.9	17.6	0.0	46.4	1069.8	195.3	441.9	967.9	1209.3	2863.2	81.4	338.2
1976	0.0	5.4	50.5	16.5	0.0	37.6	636.4	151.0	868.7	885.1	1202.0	2863.2	252.5	309.0
1977	47.6	5.3	57.1	18.0	66.7	38.8	733.3	188.6	314.3	834.4	790.5	2779.1	76.2	317.1
1978	10.1	4.7	30.3	18.6	0.0	33.0	293.0	193.5	272.8	798.7	697.0	2619.5	111.1	312.4
1979	30.9	5.2	80.8	23.3	0.0	33.2	282.9	173.2	262.7	804.8	1080.9	3092.1	141.4	305.9
1980	10.1	3.8	0.0	21.1	0.0	32.7	383.9	158.1	575.8	893.5	1747.7	3274.2	141.4	294.9

$$\text{Crime Rate} = \frac{\text{Number of Crimes}}{\text{Population}} \times 100{,}000$$

Source: Montana Department of Justice
Montana Department of Health and Environmental Sciences
Western Analysis, Inc.

Table 24

COMPARATIVE INCIDENCE AND RATE OF ADMISSIONS TO COMMUNITY AND STATE INSTITUTIONAL ALCOHOLISM TREATMENT PROGRAMS ROSEBUD COUNTY AND MONTANA, 1973-1980

	Incidence		Rate[1]	
Year	Rosebud County	Montana	Rosebud County	Montana
1973	23	745	34.9	10.2
1974	42	706	54.6	9.6
1975	42	1,060	48.8	14.2
1976	49	1,503	49.5	19.9
1977	42	2,056	40.0	26.9
1978	252	4,911	259.8	63.0
1979	181	5,320	186.6	67.7
1980	182	5,039	183.9	64.1

[1]Rate = Number of admissions per 10,000 population.

Source: Montana Department of Institutions, various years.
Western Analysis, Inc.

Table 25

SALES OF ALCOHOLIC BEVERAGES, ROSEBUD COUNTY AND MONTANA, 1971-1981

	Total Sales in Dollars		Per Capita Sales in Dollars	
Year	Rosebud County	Montana	Rosebud County	Montana
1971	302,169	31,754,625	50.09	44.76
1972	343,687	35,937,108	54.55	50.18
1973	382,250	37,873,395	57.92	51.90
1974	467,197	39,728,406	60.67	53.91
1975	567,702	42,542,020	66.01	56.87
1976	555,439	44,544,472	56.10	58.98
1977	474,570	47,543,532	45.19	62.09
1978	486,393	51,280,983	50.14	65.74
1979	535,220	55,207,718	55.17	70.23
1980	549,698	48,058,110	55.53	61.09
1981	722,611	52,333,473	55.81	65.49

Source: Montana Department of Revenue, various years.
Western Analysis, Inc.

Table 26

INCIDENCE AND RATE OF DIVORCE,
ROSEBUD COUNTY AND MONTANA, 1971-1980

	Incidence		Rate[1]	
Year	Rosebud County	Montana	Rosebud County	Montana
1971	28	3,366	4.6	4.7
1972	25	3,609	4.0	5.0
1973	23	3,772	3.5	5.2
1974	27	3,940	3.5	5.3
1975	50	4,286	5.8	5.7
1976	53	4,850	5.4	6.4
1977	59	4,813	5.6	6.3
1978	37	4,877	3.8	6.3
1979	39	5,106	4.0	6.5
1980	53	4,940	5.4	6.3

[1] $\text{Rate} = \frac{\text{Divorces and Annulments}}{\text{Population}} \times 1{,}000$

Source: Montana Department of Health and Environmental Sciences, various years.
Western Analysis, Inc.

Table 27

INCIDENCE AND RATE OF OUT-OF-WEDLOCK BIRTHS,
ROSEBUD COUNTY AND MONTANA, 1971-1980

	Incidence		Rate[1]	
Year	Rosebud County	Montana	Rosebud County	Montana
1971	32	1,137	178.8	92.1
1972	28	1,259	197.2	110.0
1973	29	1,135	181.3	99.6
1974	26	1,201	135.5	97.9
1975	44	1,219	188.9	101.0
1976	37	1,293	163.8	102.6
1977	48	1,469	206.9	110.6
1978	50	1,629	231.5	120.3
1979	56	1,596	245.7	113.5
1980	46	1,776	217.0	125.0

[1] $\text{Rate} = \frac{\text{Out-of-Wedlock Births}}{\text{Live Births}} \times 1{,}000$

Source: Montana Department of Health and Environmental Sciences, various years.
Western Analysis, Inc.

Table 28

INCIDENCE AND RATE OF ABORTION, BY PLACE OF RESIDENCE, ROSEBUD COUNTY AND MONTANA, 1974-1980[1]

	Incidence		Rate[2]	
Year	Rosebud County	Montana	Rosebud County	Montana
1974[3]	1	732	5.2	59.6
1975	7	1,535	30.9	127.2
1976	13	1,803	57.5	143.0
1977	10	2,539	43.1	190.8
1978	21	3,092	97.2	228.3
1979	11	3,447	48.2	245.2
1980	21	3,471	99.1	244.3

[1]Data unavailable prior to July, 1974.

[2]Rate = $\frac{\text{Abortions}}{\text{Live Births}} \times 1{,}000$

[3]Data are for six months, beginning July, 1974.

Source: Montana Department of Health and Environmental Sciences, various years.
Western Analysis, Inc.

Table 29

INCIDENCE AND RATE OF VENEREAL DISEASE,
ROSEBUD COUNTY AND MONTANA, 1971-1980

	Incidence		Rate[1]	
Year	Rosebud County	Montana	Rosebud County	Montana
1971	36	1,121	59.7	15.8
1972	70	1,368	111.1	19.1
1973	82	1,595	124.2	21.9
1974	108	1,965	140.3	26.7
1975	71	2,082	82.5	27.8
1976	75	2,028	75.7	26.9
1977	104	2,157	99.1	28.2
1978	68	2,126	70.1	27.3
1979	73	1,934	75.3	24.6
1980	72	1,469	72.7	18.7

[1]Rate = Number of reported cases of venereal disease per 10,000 population.

Source: Montana Department of Health and Environmental Sciences, various years.
Western Analysis, Inc.

Table 30

INCIDENCE AND RATE OF ADMISSION AND READMISSION TO THE MONTANA STATE MENTAL HOSPITAL, ROSEBUD COUNTY AND MONTANA, 1971-1980

	Incidence		Rate[1]	
Year	Rosebud County	Montana	Rosebud County	Montana
1971	41	1,749	68.0	24.7
1972	39	1,706	61.9	23.8
1973	43	1,810	65.2	24.8
1974	32	1,264	41.6	17.2
1975	1	731	1.2	9.8
1976	6	610	6.1	8.1
1977	3	549	2.9	7.2
1978	4	534	4.1	6.8
1979	4	535	4.1	6.8
1980	4	558	4.1	7.1

[1]Rate = Number of admissions and readmissions per 10,000 population.

Source: Montana Department of Institutions, various years. Western Analysis, Inc.

Table 31

A COMPARISON OF THE AVERAGE MONTHLY NUMBER OF CASES RECEIVING SELECTED PUBLIC ASSISTANCE PROGRAM BENEFITS PER 1,000 POPULATION, ROSEBUD COUNTY (RC) AND MONTANA (MT), 1971-1981

	Selected Public Assistance Programs					
	Aid to Dependent Children		Medical Assistance		Food Stamps	
Year	RC	MT	RC	MT	RC	MT
1971	21.7	8.0	11.9	16.4	7.8	14.1
1972	17.4	8.9	12.3	17.0	9.0	13.3
1973	18.2	9.1	11.6	17.2	9.9	13.1
1974	17.5	9.5	11.6	20.3	15.3	15.1
1975	14.5	9.1	11.0	22.5	20.4	16.7
1976	11.6	8.2	10.2	21.9	14.9	13.9
1977	12.0	8.1	11.5	21.8	12.4	12.2
1978	13.7	7.9	13.4	22.3	11.3	11.2
1979	14.0	7.9	12.1	21.7	27.9	15.9
1980	13.2	8.8	12.5	24.0	28.4	21.1
1981	9.9	8.8	9.1	23.3	26.6	21.9
Average	14.9	8.6	11.6	20.8	16.7	15.3

Source: Montana Department of Social and Rehabilitative Services, various years.
Western Analysis, Inc.

Table 32

A COMPARISON OF THE AVERAGE MONTHLY NUMBER OF RECIPIENTS OF GENERAL ASSISTANCE PER 10,000 POPULATION, ROSEBUD COUNTY AND MONTANA, 1971-1980

	Average Number of Recipients Per 10,000 Population	
Year	Rosebud County	Montana
1971	3.3	14.8
1972	2.5	13.2
1973	0.4	11.6
1974	0.4	10.4
1975	1.4	10.0
1976	3.5	8.8
1977	1.4	8.6
1978	1.0	7.7
1979	0.2	6.4
1980	0.8	8.1
1981	1.8	9.0

Source: Montana Department of Social and Rehabilitative Services, various years.
Western Analysis, Inc.

Table 33

A COMPARISON OF TOTAL PER CAPITA EXPENDITURES FOR PUBLIC ASSISTANCE PROGRAMS, ROSEBUD COUNTY AND MONTANA, 1971-1981.

	Total Expenditure (In Dollars)		Per Capita Expenditures (In Dollars)	
Year	Rosebud County	Montana	Rosebud County	Montana
1971	34,043	2,791,910	5.65	3.94
1972	30,642	3,000,891	4.87	4.19
1973	31,952	3,256,245	4.85	4.46
1974	30,549	3,548,768	3.97	4.82
1975	30,606	3,917,906	3.56	5.24
1976	38,094	4,335,856	3.85	5.74
1977	46,783	5,106,259	4.46	6.67
1978	53,403	5,923,376	5.51	7.59
1979	60,932	6,165,314	6.29	7.84
1980	70,947	7,366,070	7.17	9.37
1981	71,080	7,949,859	5.50[1]	9.95[1]

[1]Estimated.

Source: Montana Department of Social and Rehabilitative Services, various years.
Western Analysis, Inc.

Table 34

BASELINE PROJECTIONS OF HOUSING DEMAND IN
ROSEBUD COUNTY, COLSTRIP, AND FORSYTH, 1980-2010

	Actual	Projected Housing								
	1980	1981	1982	1983	1984	1985	1990	1995	2000	2010
Rosebud County										
Population	11,379	12,945	16,245	16,419	13,724	12,191	11,842	12,043	12,245	12,959
Households	3,764	4,415	5,684	5,743	4,643	4,066	4,170	4,428	4,638	5,003
Colstrip										
Population	3,258	4,493	7,150	7,259	5,112	3,883	3,643	3,689	3,697	3,853
Households	1,050	1,521	2,538	2,539	1,654	1,173	1,149	1,213	1,253	1,333
Forsyth										
Population	2,553	2,620	2,819	2,840	2,670	2,575	2,542	2,599	2,650	2,823
Households	932	984	1,068	1,085	1,025	998	1,042	1,115	1,173	1,277

Source: U.S. Bureau of the Census
Mountain West Research, Inc.
Sunlight Development Company
Western Analysis, Inc.

TABLE 35

Baseline Projections of School Enrollments in Colstrip School District #19 and Forsyth School District #4, 1981-2010.

	Actual 1981	Projected 1982	1983	1984	1985	1990	1995	2000	2010
Colstrip #19									
Elementary (K-8)	848	1,258	1,431	1,094	871	846	863	878	927
High School (9-12)	322	507	547	441	374	364	371	376	397
Forsyth #4									
Elementary (K-8)	568	609[1]	624	609	553	540	551	563	592
High School (9-12)	202	204[1]	244	251	261	250	256	259	274

[1]Actual.

Source: Western Analysis, Inc., 1982.

Table 36

SELECTED PUBLIC FINANCE DATA IN
ROSEBUD COUNTY TAXING JURISDICTIONS
1970 and 1980

	1970	1980
Rosebud County		
Total revenues	$2,636,911	$4,596,312
Total expenditures	2,204,047	4,255,762
Mill levies	48.33	25.16
Forsyth		
Total revenues	$ 165,499	$1,191,089
Total expenditures	155,557	978,271
Mill levies	43.00	65.00
Colstrip High School Distrist #19		
Total expenditures	$ 177,024	$ 810,720
Total general fund budget	129,312	665,040
Mill levies	17.62	9.42
Colstrip Elementary School District #19		
Total expenditures	$ 89,089	$ 907,554
Total general fund budget	59,906	799,871
Mill levies	17.08	10.33
Forsyth High School District #4		
Total expenditures	$ 220,948	$ 613,878
Total general fund budget	153,608	544,188
Mill levies	15.61	31.44
Forsyth Elementary School District #4		
Total expenditures	$ 335,300	$1,026,590
Total general fund budget	233,273	653,173
Mill levies	22.84	59.30

Source: Town of Forsyth Annual Financial Reports
Town of Forsyth Audit Reports
Montana Superintendent's Office of Public Instruction
Montana Taxpayers Association
Rosebud County Annual Financial Reports
Rosebud County Audit Reports
Western Analysis, Inc.

Table 37

AVERAGE EMPLOYMENT AT COLSTRIP GENERATING UNITS 1 AND 2 AND ROSEBUD MINE, 1970-1980

	Colstrip Generating Units 1 & 2		Rosebud Mine		
Year	Construction[1]	Operations	Construction[1]	Operations	Total
1970	0	0		10	70
1971	5	0		91	96
1972	64	1		140	205
1973	360	2		138	500
1974	863	19		147	1,029
1975	1,285	71	35	270	1,661
1976	558	184	35	287	984
1977	300	158		282	740
1978	25	197		281	503
1979	0	212	35	315	562
1980	0	231	9	300	540

[1]The average number of construction employees was based on a sampling of work source reports.

Source: Western Energy Company
Western Analysis, Inc.

Table 38

ROSEBUD MINE EXPANSION PROJECTS
AND PERMIT AWARD DATES, 1973-1981

Area	Application Date	Permit Granted	Acres
Area E			1,042
Pit 6	6/73	12/73	
Pit 6 extension	6/74	7/74	92
Area E-2	12/74	2/75	226
Area A-1	9/74	4/75	587
Area E & haul road	7/75	8/75	452
Area B	9/75	8/76	1,176
Area A	12/75	2/76	416
Area E	3/76	10/76	324
Area A	4/76	6/76	658
Area A amended	12/76	10/77	672
Area E amended	12/76	10/77	829
Area B amended	8/78	12/80	1,794
Area E	9/80	10/81	1,896
Area C	5/81	pending	2,877
Area A	9/81	pending	NA

Source: Montana Department of State Lands
Western Analysis, Inc.

Table 39

COAL BOARD GRANTS, BY BROAD PUBLIC SERVICE CATEGORY, ROSEBUD COUNTY, 1976-1982

	Coal Board[1]	Local
Schools	$10,072,497	$12,527,380
Sewer & water	5,789,688	5,262,656
Solid waste	434,860	10,000
Facilities	549,526[2]	221,000
Capital equipment	512,432	-0-
Fire	346,750	40,250
Law enforcement	237,962	459,776
Planning	47,095	1,580
Services	263,357	18,714
Total	$18,254,167	$18,541,356

[1] Reflects amount of grant award and not necessarily actual expenditures

[2] Includes $324,526 for Colstrip Community Services facility to house a fire station, law enforcement station, ambulance services and office.

Source: Montana Coal Board
Western Analysis, Inc.

Table 40

ANNUAL COAL BOARD GRANT AWARDS
ROSEBUD COUNTY, 1976-1982

Year	Amount
1976	$ 4,579,283
1977	2,952,927
1978	911,724
1979	206,570
1980	7,181,391
1981	1,391,000
1982[1]	1,031,000
Total	$18,254,167

[1]Through April 1982.

Source: Montana Coal Board
Western Analysis, Inc.

Table 41

BASELINE PUBLIC FINANCE PROJECTIONS
ROSEBUD COUNTY, 1981-2010
(1980 Dollars)

Year	Total Expenditures	Operating Expenditures	Total Revenues	Local Revenues	Property Taxes	Mills
1981[1]	$3,942,496	$3,198,206	$5,084,336	$2,555,514	$1,585,875	15.46
1982	4,830,285	4,171,980	4,830,285	3,378,417	2,150,325	21.54
1983	5,159,821	4,496,635	5,159,821	3,692,403	2,439,461	19.83
1984	4,490,850	3,930,497	4,490,850	3,264,292	2,217,007	13.46
1985	4,124,143	3,623,043	4,124,143	3,034,594	2,104,293	11.02
1990	4,097,591	3,618,401	4,097,591	3,039,234	2,135,565	10.91
1995	4,142,113	3,688,984	4,142,113	3,063,111	2,141,814	12.63
2000	4,201,124	3,741,540	4,201,124	3,106,749	2,172,327	17.07
2005	4,321,891	3,849,096	4,321,891	3,196,057	2,234,774	20.15
2010	4,446,090	3,959,707	4,446,090	3,287,903	2,298,996	22.39

[1] 1981 is actual data and may not represent a balanced budget scenario.

Source: Western Analysis, Inc.

Table 42

BASELINE PUBLIC FINANCE PROJECTIONS,
COLSTRIP HIGH SCHOOL DISTRICT #19, 1981-2010
(In 1980 Dollars)

Year	Total Expenditures	Operating Expenditures	Total Revenues	Local Property Taxes	Mills[1]
1981[2]	$2,720,067	$2,423,750	$2,607,378	$1,633,150	19.11
1982	4,011,722	3,858,865	4,011,722	2,477,309	26.59
1983	4,983,542	3,917,333	4,983,542	3,425,880	27.40
1984	3,802,728	2,758,610	3,802,728	2,705,812	17.74
1985	3,124,375	2,094,205	3,124,375	2,291,649	12.55
1990	2,979,307	1,966,639	2,979,307	2,197,306	14.30
1995	2,986,056	1,987,900	2,986,056	2,195,600	16.27
2000	2,941,447	1,993,215	2,941,447	2,148,877	21.05
2005	2,069,280	2,035,737	2,069,280	1,259,803	14.04
2010	1,860,100	1,829,948	1,860,100	1,132,451	13.56

[1]Mill rates for district levied taxes only.
[2]1981 is actual data and may not represent a balanced budget.

Source: Western Analysis, Inc.

Table 43

BASELINE PUBLIC FINANCE PROJECTIONS,
COLSTRIP ELEMENTARY SCHOOL DISTRICT #19, 1981-2010
(In 1980 Dollars)

Year	Total Expenditures	Operating Expenditures	Total Revenues	Local Property Taxes	Mills[1]
1981[2]	$3,876,011	$2,972,071	$3,780,895	$2,635,917	30.25
1982	5,611,091	4,893,382	5,611,091	3,724,023	40.97
1983	5,956,782	5,144,831	5,956,782	3,972,624	35.11
1984	4,523,872	3,756,689	4,523,872	3,126,360	22.53
1985	3,318,674	2,586,730	3,318,674	2,256,790	13.59
1990	3,030,173	2,425,274	3,030,173	2,034,568	14.52
1995	2,956,403	2,456,191	2,956,403	1,948,107	15.80
2000	2,788,277	2,463,062	2,788,277	1,777,161	19.02
2005	2,553,771	2,514,590	2,553,771	1,521,502	18.51
2010	2,606,104	2,566,120	2,606,104	1,552,682	20.29

[1] Mill rates for district levied taxes only.
[2] 1981 is actual data and may not represent a balanced budget.

Source: Western Analysis, Inc.

Table 44

BASELINE PUBLIC FINANCE PROJECTIONS
FORSYTH HIGH SCHOOL DISTRICT #4, 1981-2010
(In 1980 Dollars)

Year	Total Expenditures	Operating Expenditures	Total Revenues	Local Property Taxes	Mills[1]
1981[2]	$ 788,292	$ 698,071	$ 789,865	$367,461	23.83
1982	864,348	763,941	864,348	396,111	23.73
1983	962,856	861,836	962,856	427,793	23.03
1984	1,000,286	900,909	1,000,286	433,743	22.64
1985	1,045,878	947,895	1,045,878	442,099	22.23
1990	1,005,495	922,438	1,005,495	410,357	21.50
1995	977,216	943,483	977,216	368,500	18.88
2000	988,114	954,005	988,114	372,610	18.88
2005	1,013,544	978,556	1,013,544	382,199	18.88
2010	1,046,237	1,010,122	1,046,237	394,526	18.88

[1] Mill rates for district levied taxes only.
[2] 1981 is actual data and may not represent a balanced budget.

Source: Western Analysis, Inc.

Table 45

BASELINE PUBLIC FINANCE PROJECTIONS
FORSYTH ELEMENTARY SCHOOL DISTRICT #4, 1981-2010
(In 1980 Dollars)

Year	Total Expenditures	Operating Expenditures	Total Revenues	Local Property Taxes	Mills[1]
1981[2]	$1,027,790	$ 971,533	$1,028,245	$316,119	54.14
1982	1,082,108	1,026,063	1,082,108	332,876	57.03
1983	1,156,225	1,100,010	1,156,225	356,119	60.16
1984	1,143,105	1,088,544	1,143,105	354,482	63.98
1985	1,040,412	989,032	1,040,412	323,883	67.11
1990	1,010,020	964,661	1,010,020	311,147	81.62
1995	1,025,241	984,970	1,025,241	311,654	98.86
2000	1,026,268	1,005,279	1,026,268	297,969	114.35
2005	1,053,221	1,031,680	1,053,221	305,794	141.20
2010	1,080,174	1,058,082	1,080,174	313,621	174.35

[1]Mill rates for district levied taxes only.
[2]1981 is actual data and may not represent a balanced budget.

Source: Western Analysis, Inc.

Table 46

BASELINE PUBLIC FINANCE PROJECTIONS,
FORSYTH, MONTANA, 1981-2010
(In 1980 Dollars)

Year	Total Expenditures	Operating Expenditures	Total Revenues	Local Revenues	Property Taxes	Mills
1981	$949,373	$534,570	$942,648	$480,912	$126,560	68.00[1]
1982	834,382	585,475	884,471	511,867	126,874	69.25[1]
1983	850,765	600,419	850,765	550,462	158,806	89.08
1984	803,176	564,479	803,176	520,848	152,352	94.12
1985	776,582	544,394	776,582	504,299	148,638	98.59
1990	767,344	537,418	767,344	498,551	146,058	116.79
1995	783,300	549,468	783,300	508,480	146,615	136.45
2000	797,577	560,251	797,577	517,364	146,852	159.52
2005	821,372	578,221	821,372	532,171	148,126	185.53
2010	798,643	596,825	798,643	500,136	101,977	147.26

[1]Actual data and many not represent a balanced budget scenario.

Source: Western Analysis, Inc.

Table 47

BASELINE PUBLIC FINANCE PROJECTIONS,
COLSTRIP TOWNSITE, 1980-2010
(1980 Dollars)

	Total Expenditures	Operating Expenses	Total Revenues	Local Revenues
1980[1]	$4,813,065	$ 701,250	$5,223,915	$1,112,100
1981	2,167,249	1,061,249	2,580,281	1,474,281
1982	2,008,965	1,858,965	2,418,421	2,268,421
1983	2,383,607	2,083,607	2,537,850	2,237,850
1984	1,534,511	1,534,511	1,546,697	1,546,697
1985	1,165,592	1,165,592	1,174,848	1,174,848
1990	1,093,549	1,093,549	1,102,233	1,102,233
1995	1,107,358	1,107,358	1,116,151	1,116,151
2000	1,109,759	1,109,759	1,118,572	1,118,572
2005	1,132,873	1,132,873	1,141,869	1,141,869
2010	1,156,586	1,156,586	1,165,771	1,165,771

[1] 1980 is actual data.

Source: Western Analysis, Inc.

Table 48

PROJECTED ROSEBUD COUNTY EMPLOYMENT AND POPULATION,
ROSEBUD COUNTY, COLSTRIP, AND FORSYTH CUMULATIVE IMPACT SCENARIO, 1984-2010

Year	Mining	Construction	Total Basic	Total Nonbasic	Total Employment	Rosebud Population	Colstrip Population	Forsyth Population
1984	17	66	83	15	98	206	120	16
1985	34	492	526	30	556	1,170	746	99
1986	111	342	453	99	552	1,083	725	96
1987	136	0	136	121	257	525	368	49
1988	162	0	162	145	307	625	438	58
1989	187	0	187	168	355	719	503	67
1990	213	0	213	192	405	817	572	76
1991	238	0	238	215	453	913	639	85
1992	285	0	285	258	543	1,094	766	102
1993	339	19	358	308	666	1,341	939	125
1994	372	323	695	338	1,033	2,083	1,458	194
1995	512	249	761	467	1,228	2,471	1,730	230
1996	548	0	548	502	1,050	2,100	1,470	195
1997	614	16	630	565	1,195	2,378	1,665	221
1998	694	274	968	642	1,610	3,207	2,245	298
1999	792	530	1,322	735	2,057	4,116	2,881	383
2000	925	258	1,183	863	2,046	4,066	2,846	378
2001	994	0	994	930	1,924	3,793	2,655	353
2002	1,108	0	1,108	1,040	2,148	4,633	2,963	394
2003	1,202	16	1,218	1,133	2,351	4,634	3,244	431
2004	1,243	255	1,498	1,176	2,674	5,277	3,694	491
2005	1,208	198	1,406	1,147	2,553	5,038	3,527	469
2006	1,253	0	1,253	1,194	2,447	4,823	3,376	449
2007	1,240	0	1,240	1,186	2,426	4,782	3,347	445
2008	1,238	0	1,238	1,188	2,426	4,783	3,348	445
2009	1,288	0	1,288	1,241	2,529	4,986	3,490	464
2010	1,370	0	1,370	1,324	2,694	5,312	3,718	494

Source: Western Analysis, Inc.

Table 49

CONSTRUCTION EMPLOYMENT OF PROJECTS
UNDER CUMULATIVE IMPACT SCENARIO

Project	Construction Year	Employment
Montco Mine	1984	25
	1985	450
	1986	350
Tongue River Railroad	1984	108
	1985	302
	1986	143
Mine No. 2	1993	25
	1994	450
	1995	350
Otter Creek Spur	1993	10
	1994	27
	1995	15
Mine No. 3	1997	25
	1998	450
	1999	350
Mine No. 4	1998	25
	1999	450
	2000	350
Mine No. 5	2003	25
	2004	450
	2005	350

Source: Mountain West Research, Inc.
Western Analysis, Inc.

Table 50

OPERATIONS EMPLOYMENT, AND PRODUCTION OF POTENTIAL PROJECTS
UNDER CUMULATIVE IMPACT SCENARIO

	Montco Mine		Tongue River Railroad	Mine #2		Mine #3		Mine #4		Mine #5	
Year	Work Force	Production (mm tons)	Work Force	Work Force	Production (mm tons)	Work Force	Production (mm tons)	Work Force	Production (mm tons)	Work Force	Production (mm tons)
1984	20	0									
1985	40	0									
1986	130	1	24								
1987	160	2	27								
1988	190	4	33								
1989	220	6	38								
1990	250	6	38								
1991	280	6	38								
1992	335	9	47								
1993	380	12	55	20							
1994	400	12	55	40							
1995	480	12	55	130	1						
1996	480	12	58	175	3						
1997	525	12	64	190	4	20					
1998	560	12	66	210	4	40					
1999	560	12	66	220	6	130	1				
2000	560	12	75	240	6	175	3	130	1		
2001	560	12	83	260	6	190	4	175	3		
2002	560	12	92	350	8	220	6	190	4		
2003	560	12	106	400	10	240	6	220	6	20	
2004	530	12	117	420	10	260	6	240	6	40	
2005	280	8	106	440	10	350	8	260	6	130	1
2006	140	0	92	460	10	400	10	340	8	175	3
2007	70	0	109	460	10	420	10	360	9	190	4
2008			115	460	10	440	10	380	9	220	6
2009			120	460	10	460	10	400	9	240	6
2010			120	460	10	460	10	420	9	320	8

Source: Mountain West Research, Inc.
Western Analysis, Inc.

Table 51

PROJECTED EMPLOYMENT IMPACT, CUMULATIVE SCENARIO
ROSEBUD COUNTY, 1984-2010

	1984	1985	1986	1990	1995	2000	2004	2005	2010
Mining	17	34	111	213	512	925	1,243	1,208	1,370
Construction	66	492	342	-0-	249	258	255	198	-0-
Total Basic	83	526	453	213	761	1,183	1,498	1,406	1,370
Total Nonbasic	15	30	99	192	467	863	1,176	1,147	1,324
Cumulative Scenario Employment	98	556	552	405	1,228	2,046	2,674	2,553	2,694
Baseline Employment	6,729	5,940	5,930	5,890	6,033	6,233	6,376	6,412	6,596
Total Employment	6,827	6,496	6,482	6,295	7,261	8,279	9,050	8,965	9,290
Percent Change	1.46	9.36	9.31	6.88	20.35	32.83	41.94	39.82	40.84

Source: Western Analysis, Inc.

Table 52

PROJECTED BASELINE AND CUMULATIVE SCENARIO POPULATION COMPARISONS
ROSEBUD COUNTY, COLSTRIP, AND FORSYTH, MONTANA
1983-2010

	1983	1984	1985	1986	1990	1995	2000	2004	2005	2010
Rosebud Baseline Population	16,419	13,724	12,191	12,120	11,842	12,073	12,245	12,526	12,597	12,959
Cumulative Scenario Population	-0-	206	1,170	1,083	817	2,471	4,066	5,277	5,038	5,312
Total Population	16,419	13,930	13,361	13,203	12,659	14,544	16,311	17,083	17,635	18,271
Percent Change	0.0	1.5	9.6	8.9	6.9	20.5	33.2	42.3	40.0	41.0
Colstrip Baseline Population	7,259	5,112	3,883	3,834	3,643	3,689	3,697	3,759	3,744	3,853
Cumulative Scenario Population	-0-	120	746	725	572	1,730	2,846	3,694	3,527	3,718
Total Population	7,259	5,232	4,629	4,559	4,215	5,419	6,543	7,453	7,301	7,571
Percent Change	0.0	2.3	19.2	18.9	15.7	46.9	77.0	98.3	93.5	96.5
Forsyth Baseline Population	2,840	2,670	2,575	2,568	2,542	2,599	2,650	2,718	2,735	2,823
Cumulative Scenario Population	0	16	99	96	76	230	378	491	469	494
Total Population	2,840	2,686	2,674	2,664	2,618	2,829	3,028	3,209	3,204	3,317
Percent Change	0.0	0.6	3.8	3.7	3.0	8.8	14.3	18.1	17.1	17.5

Source: Western Analysis, Inc.

Table 53

PROJECTED PERSONAL INCOME TAX PAYMENTS
FROM ROSEBUD COUNTY, CUMULATIVE SCENARIO, 1984-2010
(Thousands of 1980 Dollars)

	Total Earnings	Income Tax Mine Operation	Income Tax Construction	Total Income Tax
1984	$ 2,3¢2	$ 18	$ 62	$ 80
1985	15,364	37	476	513
1986	13,669	125	339	464
1987	4,378	158	0	158
1988	5,389	195	0	195
1989	6,429	232	0	232
1990	7,567	273	0	273
1991	8,738	315	0	315
1992	10,812	390	0	390
1993	13,958	480	22	502
1994	26,663	544	385	929
1995	30,568	774	303	1,077
1996	24,716	892	0	892
1997	30,448	1,077	20	1,097
1998	47,068	1,311	357	1,668
1999	65,901	1,612	705	2,317
2000	66,767	2,029	351	2,380
2001	62,864	2,269	0	2,269
2002	72,946	2,633	0	2,633
2003	83,079	2,974	23	2,997
2004	100,069	3,201	378	3,579
2005	98,828	3,239	300	3,539
2006	96,879	3,497	0	3,497
2007	99,808	3,603	0	3,603
2008	103,734	3,745	0	3,745
2009	112,352	4,056	0	4,056
2010	124,392	4,491	0	4,491

Source: Western Analysis, Inc.

Table 54

TOTAL PERSONAL INCOME TAX PAYMENTS,
MONTANA, CUMULATIVE SCENARIO, 1984-2010
(Thousands of 1980 Dollars)

	Total Earnings	Total Income Taxes Paid	Inside Rosebud County	Outside Rosebud County
1984	$ 4,384	$ 147	$ 80	$ 67
1985	22,402	772	513	259
1986	19,562	664	464	200
1987	6,071	220	158	62
1988	7,482	271	195	76
1989	8,944	324	232	92
1990	10,308	374	273	101
1991	11,740	425	315	110
1992	14,557	527	390	137
1993	19,125	689	502	187
1994	37,210	1,296	929	367
1995	41,244	1,452	1,077	375
1996	32,059	1,159	892	267
1997	39,527	1,427	1,097	330
1998	65,094	2,298	1,668	630
1999	88,746	3,113	2,317	796
2000	85,113	3,034	2,380	654
2001	79,076	2,858	2,269	589
2002	91,603	3,311	2,633	678
2003	105,337	3,804	2,997	807
2004	132,686	4,738	3,579	1,159
2005	130,245	4,660	3,539	1,121
2006	122,336	4,421	3,497	924
2007	127,051	4,592	3,603	989
2008	132,523	4,790	3,745	1,045
2009	143,394	5,183	4,056	1,127
2010	158,224	5,719	4,491	1,228

Source: Western Analysis, Inc.

Table 55

PROJECTED PERSONAL INCOME IN ROSEBUD COUNTY
AND CUMULATIVE SCENARIO, 1984-2010
(In Thousands of 1980 Dollars)

	Mining	Construction	Other Non-Agriculture	Social Security	Property Income & Transfer Payments	Personal Income	Impact Population	Per Capita Income[1]
1984	$ 496	$ 1,866	$ 179	$ 171	$ 406	$ 2,776	206	$13,476
1985	1,025	14,339	367	1,109	1,634	16,256	1,170	13,894
1986	3,458	10,211	1,238	1,066	1,781	15,622	1,083	14,425
1987	4,378	0	1,549	424	980	6,590	525	12,552
1988	5,389	0	1,901	521	1,296	8,065	625	12,904
1989	6,429	0	2,174	615	1,607	9,595	719	13,345
1990	7,567	0	2,638	781	1,942	11,366	817	13,912
1991	8,738	0	3,017	899	2,272	13,128	913	14,379
1992	10,812	0	3,699	1,110	2,694	16,095	1,094	14,712
1993	13,291	667	4,510	1,413	3,210	20,265	1,341	15,112
1994	15,072	11,591	5,055	2,427	4,760	34,051	2,083	16,347
1995	21,436	9,132	7,134	2,884	5,432	40,250	2,471	16,289
1996	24,716	0	7,840	2,491	5,138	35,203	2,100	16,763
1997	29,835	613	9,020	3,019	5,988	42,365	2,378	17,815
1998	36,329	10,739	10,478	4,403	7,594	60,737	3,207	18,939
1999	44,663	21,238	12,263	5,979	9,396	81,581	4,116	19,820
2000	56,197	10,570	14,772	6,238	9,866	85,167	4,066	20,946
2001	62,864	0	16,261	6,053	9,890	82,962	3,793	21,872
2002	72,946	0	18,574	7,001	11,056	95,575	4,633	20,629
2003	82,380	699	20,670	7,936	12,211	108,024	4,634	23,311
2004	88,681	11,388	21,959	9,335	13,832	126,525	5,277	23,977
2005	89,792	9,036	21,835	9,224	13,937	125,376	5,038	24,886

Table 55

PERSONAL INCOME AND CUMULATIVE IMPACT,
ROSEBUD COUNTY, 1984-2010
(In Thousands of 1980 Dollars)
(Continued)

	Mining	Construction	Other Non-Agriculture	Social Security	Property Income & Transfer Payments	Personal Income	Impact Population	Per Capita Income[1]
2006	$ 96,879	$ 0	$23,219	$ 9,187	$14,103	$125,014	$4,823	$25,995
2007	99,808	0	23,559	9,437	14,565	128,495	4,782	26,871
2008	103,734	0	24,106	9,780	15,121	133,181	4,783	27,845
2009	112,352	0	25,722	10,563	16,121	143,632	4,986	28,807
2010	124,392	0	28,034	11,661	17,439	158,204	5,312	29,782

[1]Per capita income is not shown in thousands of dollars.

Source: Western Analysis, Inc.

Table 56

BASELINE AND CUMULATIVE SCENARIO PROJECTIONS
OF HOUSING DEMAND, ROSEBUD COUNTY, COLSTRIP, AND FORSYTH
1980-2010

	Actual 1980	1984	1985	1986	1990	1994	1995	1999	2000	2004	2005	2010
Rosebud County												
Baseline households	3,764	4,643	4,066	4,081	4,170	4,373	4,428	4,590	4,638	4,763	4,808	5,003
Impact households		71	420	385	288	761	908	1,558	1,441	2,008	1,924	2,051
Total	3,764	4,714	4,486	4,466	4,458	5,134	5,336	6,148	6,079	6,471	6,732	7,054
Colstrip												
Baseline households	1,050	1,654	1,173	1,155	1,149	1,203	1,213	1,244	1,253	1,283	1,292	1,333
Impact households		39	258	243	183	487	580	1,004	992	1,281	1,227	1,305
Total	1,050	1,693	1,431	1,398	1,332	1,690	1,793	2,248	2,245	2,564	2,519	2,638
Forsyth												
Baseline households	932	1,025	998	1,007	1,042	1,101	1,115	1,158	1,173	1,208	1,221	1,277
Impact households		6	39	38	31	85	101	166	165	218	210	233
Total		1,031	1,037	1,045	1,073	1,186	1,216	1,324	1,338	1,426	1,431	1,500

Source: U.S. Bureau of the Census
Mountain West Research, Inc.
Western Analysis, Inc.
Sunlight Development Company

TABLE 56a

Baseline and Cumulative Scenario School Enrollment Projections, Colstrip School District #19 and Forsyth School District #4, 1981-2000.

	Actual 1981	Projected 1984	1985	1990	1993	1995	2000	2004	2010
Colstrip #19									
Elementary (K-8)									
Baseline	848	1,094	871	846	857	863	878	897	927
Impact		20	116	89	146	270	444	575	579
Total		1,114	987	935	1,003	1,133	1,322	1,472	1,506
High School (9-12)									
Baseline	322	441	374	364	370	371	376	385	397
Impact		6	38	29	47	87	143	186	187
Total		447	412	393	417	458	519	571	584
Forsyth #4									
Elementary (K-8)									
Baseline	568	609	553	540	546	551	559	571	592
Impact		2	15	12	19	36	59	76	77
Total		611	568	552	565	587	618	647	669
High School (9-12)									
Baseline	202	251	261	250	254	256	259	265	274
Impact		4	21	10	17	31	51	66	67
Total		255	282	260	271	287	310	331	341

Source: Western Analysis, Inc., 1982.

Table 57

ACTUAL AND PROJECTED FISCAL CONDITIONS DUE TO CUMULATIVE SCENARIO, ROSEBUD COUNTY, 1981-2010
(1980 Dollars)

Year	Total Expenditures	Operating Expenditures	Total Revenues	Local Revenues	Property Taxes[1]	Cumulative Scenario Property Taxes[2]	Mills
1981[3]	$3,942,496	$3,198,206	$5,084,336	$2,555,514	$1,585,875	$ -0-	15.46
1982	4,830,285	4,171,980	4,830,285	3,378,417	2,150,325	-0-	21.54
1983	5,159,821	4,496,635	5,159,821	3,692,403	2,330,264	-0-	19.83
1984	4,557,580	3,989,495	4,557,580	3,312,611	2,224,351	25,255	13.51
1985	4,515,768	3,970,755	4,515,768	3,321,653	2,252,581	49,487	11.80
1990	4,377,895	3,868,040	4,377,895	3,246,519	2,065,945	214,560	10.56
1995	5,005,557	4,444,015	5,005,557	3,705,712	2,098,553	497,299	12.37
2000	5,639,060	4,983,933	5,639,060	4,181,294	2,134,333	802,261	16.77
2005	6,093,310	5,388,490	6,093,310	4,517,213	2,189,997	981,480	19.75
2010	6,311,513	5,582,824	6,311,513	4,678,576	2,542,612	741,695	24.76

[1] Property taxes collected on non-cumulative scenario taxable value from impact district mill levies.
[2] Property taxes colelcted on cumulative scenario coal production and equipment from impact district mill levies.
[3] 1981 is actual data and may not represent a balanced budget scenario.

Source: Western Analysis, Inc.

Table 58

PROJECTED INCREASE IN TAXABLE VALUE
DUE TO CUMULATIVE SCENARIO, ROSEBUD COUNTY AND
COLSTRIP HIGH SCHOOL DISTRICT #19, 1984-2010
(In 1980 Dollars)

	Capital Investment Taxable Value	Gross Proceeds Taxable Value
1984	$1,870,000	$ -0-
1985	4,194,872	-0-
1986	4,404,597	2,695,500
1987	4,537,341	5,868,000
1988	4,288,712	11,736,000
1989	3,822,467	16,281,000
1990	4,046,079	16,281,000
1995	6,711,525	33,480,000
2000	9,451,843	38,376,000
2005	9,448,557	40,257,000
2010	4,922,460	25,029,000

Source: Western Energy Company
Western Analysis, Inc.

Table 59

PERCENTAGE CHANGE AND TAXABLE VALUE DUE TO
CUMULATIVE SCENARIO, ROSEBUD COUNTY
1981-2010
(In 1980 Dollars)

	Baseline Taxable Value	Impact Taxable Value	Percent Net Change
1981	$ 78,058,934	$ 78,058,934	0.00%
1982	99,827,548	99,827,548	0.00
1983	123,005,107	123,005,107	0.00
1984	164,700,985	166,570,985	1.14
1985	190,945,840	195,140,712	2.20
1990	195,724,446	216,051,525	10.39
1995	169,604,163	209,795,688	23.70
2000	127,241,104	175,068,947	37.59
2005	110,909,038	160,614,595	44.82
2010	102,676,888	132,628,348	29.17

Source: Western Analysis, Inc.

Table 60

NET EFFECTS OF CUMULATIVE SCENARIO ON
LOCAL REVENUES AND OPERATING EXPENDITURES
ROSEBUD COUNTY, 1981-2010
(1980 Dollars)

	Net Change Operating Expenditures	Net Percent Change	Net Change Local Revenues	Net Percent Change
1981	$ -0-	0.0%	$ -0-	0.0%
1982	-0-	0.0	-0-	0.0
1983	-0-	0.0	-0-	0.0
1984	58,998	1.50	48,319	1.48
1985	347,712	9.60	287,059	9.46
1990	249,639	6.90	207,285	6.82
1995	755,031	20.47	642,601	20.98
2000	1,242,393	33.21	1,074,545	34.59
2005	1,539,394	39.99	1,321,156	41.34
2010	1,623,117	40.99	1,390,673	42.30

Source: Western Analysis, Inc.

Table 61

ACTUAL AND PROJECTED FISCAL CONDITIONS DUE TO CUMULATIVE SCENARIO, FORSYTH, 1982-2010

Year	Total Expenditures	Operating Expenditures	Total Revenues	Local Revenues	Property Taxes	Mills
1982[1]	$834,382	$585,475	$884,471	$511,867	$126,874	69.25
1983	850,765	600,419	850,765	550,462	158,806	89.08
1984	807,655	567,861	807,655	523,635	152,931	93.92
1985	804,296	565,324	804,296	521,545	152,210	97.22
1990	788,619	553,485	788,619	511,790	148,758	115.49
1995	847,686	598,094	847,686	548,545	154,657	132.23
2000	915,787	640,165	915,787	595,604	172,241	163.74
2005	965,056	677,375	965,056	626,263	176,361	188.56
2010	949,327	701,265	949,327	598,584	130,751	160.69

[1]1982 is actual data and may not represent a balanced budget scenario.

Source: Western Analysis, Inc.

Table 62

PERCENTAGE CHANGE IN FORSYTH
TAXABLE VALUE DUE TO CUMULATIVE SCENARIO
1982-2010
(1980 Dollars)

	Baseline Taxable Value	Impact Taxable Value	Percent Net Change
1982	$1,832,118	$1,832,118	0.0%
1983	1,782,641	1,782,641	0.0
1984	1,618,616	1,628,316	0.60
1985	1,507,638	1,565,602	3.84
1990	1,250,638	1,288,029	2.99
1995	1,074,480	1,169,567	8.85
2000	920,606	1,051,923	14.26
2005	798,401	935,312	17.15
2010	692,486	813,665	17.50

Source: Western Analysis, Inc.

Table 63

NET EFFECTS OF CUMULATIVE SCENARIO
ON LOCAL REVENUES AND OPERATING EXPENDITURES
FORSYTH, 1982-2010
(1980 Dollars)

	Net Change Operating Expenditures	Net Percent Change	Net Change Local Revenues	Net Percent Change
1982	$ -0-	0.0%	$ -0-	0.0%
1983	-0-	0.0	-0-	0.0
1984	3,382	0.60	2,787	0.54
1985	20,930	3.84	17,246	3.42
1990	16,067	2.99	13,239	2.66
1995	48,626	8.85	40,065	7.88
2000	79,914	14.26	78,240	15.12
2005	99,154	17.15	94,092	17.68
2010	104,440	17.50	98,448	19.68

Source: Western Analysis, Inc.

Table 64

ACTUAL AND PROJECTED FISCAL CONDITION DUE
TO CUMULATIVE SCENARIO, COLSTRIP TOWNSITE, 1980-2010
(1980 Dollars)

	Total Expenditures	Operating Expenses	Total Revenues	Local Revenues
1980[1]	$4,813,065	$ 701,250	$5,223,915	$1,112,100
1981	2,167,249	1,061,249	2,580,281	1,474,281
1982	2,008,965	1,858,965	2,418,421	2,268,421
1983	2,383,607	2,083,607	2,537,850	2,237,850
1984	1,570,533	1,570,533	1,583,005	1,583,005
1985	1,389,525	1,389,525	1,400,560	1,400,560
1990	1,265,251	1,265,251	1,275,299	1,275,299
1995	1,626,666	1,626,666	1,639,584	1,639,584
2000	1,964,066	1,964,066	1,979,663	1,979,663
2005	2,191,602	2,191,602	2,209,005	2,209,005
2010	2,272,651	2,272,651	2,207,474	2,207,474

[1] 1980 is actual data.

Source: Western Analysis, Inc.

Table 65

NET EFFECTS OF CUMULATIVE SCENARIO
ON LOCAL REVENUES AND OPERATING EXPENDITURES,
COLSTRIP TOWNSITE, 1981-2010
(1980 Dollars)

	Net Change Operating Expenditures	Net Percent Change	Net Change Local Revenues	Net Percent Change
1981	$ -0-	0.0%	$ -0-	0.0%
1982	-0-	0.0	-0-	0.0
1983	-0-	0.0	-0-	0.0
1984	36,022	2.35	36,308	2.35
1985	223,933	19.21	225,712	19.21
1990	171,702	15.70	173,066	15.70
1995	519,308	46.90	523,433	46.90
2000	854,307	76.98	860,911	76.95
2005	1,058,729	93.46	1,067,136	93.46
2010	1,116,065	96.50	1,041,703	96.50

Source: Western Analysis, Inc.

Table 66

ACTUAL AND PROJECTED FISCAL CONDITIONS DUE TO CUMULATIVE SCENARIO,
COLSTRIP ELEMENTARY SCHOOL DISTRICT #19, 1981-2010
(In 1980 Dollars)

Year	Total Expenditures	Operating Expenditures	Total Revenues	Local Property[1] Taxes	Cumulative Scenario[2] Property Taxes	Mills
1981[3]	$3,876,011	$2,972,071	$3,780,895	$2,635,917	$ -0-	30.25
1982	5,611,091	4,893,382	5,611,091	3,724,023	-0-	40.97
1983	5,956,782	5,144,831	5,956,782	3,972,624	-0-	35.11
1984	4,612,292	3,843,877	4,612,292	3,182,344	-0-	22.94
1985	3,548,932	2,813,456	3,548,932	2,393,975	-0-	14.42
1990	3,274,386	2,665,741	3,274,386	2,180,067	-0-	15.55
1995	3,741,374	3,229,119	3,741,374	2,415,782	-0-	19.59
2000	4,114,005	3,768,450	4,114,005	2,405,899	161,112	25.76
2005	4,280,707	4,215,030	4,280,707	1,984,559	565,827	24.14
2010	4,360,949	4,294,041	4,360,949	1,867,424	730,771	24.40

[1]Property taxes collected on non-cumulative scenario taxable value from impact district mill levies.
[2]Property taxes collected on cumulative scenario coal production and equipment from impact district mill levies.
[3]1981 is actual data and may not represent a balance budget scenario.

Source: Western Analysis, Inc.

Table 67

NET EFFECTS OF CUMULATIVE SCENARIO ON
LOCAL REVENUES AND OPERATING EXPENDITURES,
COLSTRIP ELEMENTARY SCHOOL DISTRICT #19, 1981-2010
(1980 Dollars)

	Net Change Operating Expenditures	Net Percent Change	Net Change Local Property Taxes	Net Percent Change
1981	$ -0-	0.0 %	$ -0-	0.0 %
1982	-0-	0.0	-0-	0.0
1983	-0-	0.0	-0-	0.0
1984	87,188	2.32	55,984	1.79
1985	226,726	8.76	137,185	6.08
1990	240,467	9.92	145,499	7.15
1995	772,928	31.47	467,675	24.01
2000	1,305,388	53.00	628,738	35.38
2005	1,700,440	67.62	463,057	30.43
2010	1,727,921	67.34	314,742	20.27

Source: Western Analysis, Inc.

Table 68

PROJECTED INCREASE IN TAXABLE VALUE
DUE TO CUMULATIVE SCENARIO, COLSTRIP
ELEMENTARY SCHOOL DISTRICT #19, 1984-2010
(In 1980 Dollars)

	Capital Investment Taxable Value	Gross Proceeds Taxable Value
1984	$ -0-	$ -0-
1985	-0-	-0-
1990	-0-	-0-
1995	-0-	-0-
2000	3,303,448	2,952,000
2005	6,187,937	17,252,000
2010	4,922,460	25,029,000

Source: Western Energy Company
Western Analysis, Inc.

Table 69

ACTUAL AND PROJECTED FISCAL CONDITIONS DUE TO CUMULATIVE SCENARIO,
COLSTRIP ELEMENTARY SCHOOL DISTRICT #19, 1981-2010
(In 1980 Dollars)

Year	Total Expenditures	Operating Expenditures	Total Revenues	Local Property Taxes[1]	Cumulative Scenario Property Taxes[2]	Mills
1981[3]	$3,876,011	$2,972,071	$3,780,895	$2,635,917	$ -0-	30.25
1982	5,611,091	4,893,382	5,611,091	3,724,023	-0-	40.97
1983	5,956,782	5,144,831	5,956,782	3,972,624	-0-	35.11
1984	4,612,292	3,843,877	4,612,292	3,182,344	-0-	22.94
1985	3,548,932	2,813,456	3,548,932	2,393,975	-0-	14.42
1990	3,274,386	2,665,741	3,274,386	2,180,067	-0-	15.55
1995	3,741,374	3,229,119	3,741,374	2,415,782	-0-	19.59
2000	4,114,005	3,768,450	4,114,005	2,405,899	161,112	25.76
2005	4,280,707	4,215,030	4,280,707	1,984,559	565,827	24.14
2010	4,360,949	4,294,041	4,360,949	1,867,424	730,771	24.40

[1]Property taxes collected on non-cumulative scenario taxable value from impact district mill levies.
[2]Property taxes collected on cumulative scenario coal production and equipment from impact district mill levies.
[3]1981 is actual data and may not represent a balance budget scenario.

Source: Western Analysis, Inc.

Table 70

NET EFFECTS OF CUMULATIVE SCENARIO ON
LOCAL REVENUES AND OPERATING EXPENDITURES,
COLSTRIP HIGH SCHOOL DISTRICT #19, 1981-2010
(1980 Dollars)

	Net Change Operating Expenditures	Net Percent Change	Net Change Local Property Taxes	Net Percent Change
1981	$ -0-	0.0 %	$ -0-	0.0 %
1982	-0-	0.0	-0-	0.0
1983	-0-	0.0	-0-	0.0
1984	42,522	1.54	-6,776	-0.25
1985	116,935	5.58	19,268	0.84
1990	143,512	7.30	-178,285	-8.11
1995	473,057	23.80	-278,235	-12.67
2000	791,971	39.73	-351,895	-16.38
2005	1,041,788	51.17	-34,254	-2.72
2010	1,305,715	71.35	295,874	26.13

Source: Western Analysis, Inc.

Table 71

ACTUAL AND PROJECTED FISCAL CONDITIONS DUE TO CUMULATIVE SCENARIO,
FORSYTH ELEMENTARY SCHOOL DISTRICT #4, 1981-2010
(In 1980 Dollars)

Year	Total Expenditures	Operating Expenditures	Total Revenues	Local Property Taxes[1]	Cumulative Scenario Property Taxes[2]	Mills
1981[3]	$1,027,790	$ 971,533	$1,028,245	$ 316,119	$ -0-	54.14
1982	1,082,108	1,026,063	1,082,108	332,876	-0-	57.03
1983	1,156,225	1,100,010	1,156,225	356,119	-0-	60.16
1984	1,147,252	1,092,606	1,147,252	355,686	-0-	63.96
1985	1,067,365	1,015,433	1,065,365	331,709	-0-	66.94
1990	1,032,826	987,001	1,032,826	317,768	-0-	81.47
1995	1,091,585	1,049,958	1,091,585	330,917	-0-	98.47
2000	1,127,859	1,104,791	1,127,859	327,465	-0-	114.35
2005	1,185,910	1,161,655	1,185,910	344,320	-0-	141.20
2010	1,221,155	1,196,180	1,221,155	354,552	-0-	174.35

[1]Property taxes collected on non-cumulative scenario taxable value from impact district mill levies.
[2]Property taxes collected on cumulative scenario coal production and equipment from impact district mill levies.
[3]1981 is actual data and may not represent a balance budget scenario.

Source: Western Analysis, Inc.

Table 72

NET EFFECTS OF CUMULATIVE SCENARIO ON
LOCAL REVENUES AND OPERATING EXPENDITURES,
FORSYTH ELEMENTARY SCHOOL DISTRICT #4, 1981-2010
(1980 Dollars)

	Net Change Operating Expenditures	Net Percent Change	Net Change Local Property Taxes	Net Percent Change
1981	$ -0-	0.0 %	$ -0-	0.0 %
1982	-0-	0.0	-0-	0.0
1983	-0-	0.0	-0-	0.0
1984	4,062	0.37	1,204	0.34
1985	26,401	2.67	7,826	2.42
1990	22,340	2.32	6,621	2.13
1995	64,988	6.60	19,263	6.18
2000	99,512	9.90	29,496	9.90
2005	129,975	12.60	38,526	12.60
2010	138,098	13.05	40,931	13.05

Source: Western Analysis, Inc.

Table 73

ACTUAL AND PROJECTED FISCAL CONDITIONS DUE TO CUMULATIVE SCENARIO,
FORSYTH HIGH SCHOOL DISTRICT #4, 1981-2010
(In 1980 Dollars)

Year	Total Expenditures	Operating Expenditures	Total Revenues	Local Property Taxes[1]	Cumulative Scenario Property Taxes[2]	Mills
1981[3]	$ 788,292	$ 698,071	$ 789,865	$367,461	$ -0-	23.85
1982	864,348	763,941	864,348	396,111	-0-	23.73
1983	962,856	861,836	962,856	427,793	-0-	23.03
1984	1,014,437	914,559	1,014,437	439,311	-0-	22.59
1985	1,124,745	1,024,003	1,124,745	472,487	-0-	21.99
1990	1,041,823	957,512	1,041,823	424,056	-0-	21.41
1995	1,093,465	1,055,718	1,093,465	412,337	-0-	18.88
2000	1,184,284	1,143,403	1,184,284	446,584	-0-	18.88
2005	1,271,471	1,227,579	1,271,471	479,462	-0-	18.88
2010	1,300,533	1,255,639	1,300,533	490,420	-0-	18.88

[1]Property taxes collected on non-cumulative scenario taxable value from impact district mill levies.
[2]Property taxes collected on cumulative scenario coal production and equipment from impact district mill levies.
[3]1981 is actual data and may not represent a balance budget scenario.

Source: Western Analysis, Inc.

Table 74

NET EFFECTS OF CUMULATIVE SCENARIO ON
LOCAL REVENUES AND OPERATING EXPENDITURES,
FORSYTH HIGH SCHOOL DISTRICT #4, 1981-2010
(1980 Dollars)

	Net Change Operating Expenditures	Net Percent Change	Net Change Local Property Taxes	Net Percent Change
1981	$ -0-	0.0 %	$ -0-	0.0 %
1982	-0-	0.0	-0-	0.0
1983	-0-	0.0	-0-	0.0
1984	13,650	1.52	5,568	1.28
1985	76,108	8.03	30,388	6.87
1990	35,074	3.80	13,699	3.34
1995	133,280	11.90	43,837	11.90
2000	189,398	19.85	73,974	19.85
2005	249,023	25.45	97,263	25.45
2010	245,517	24.31	95,894	24.31

Source: Western Analysis, Inc.

TABLE 75

MONTANA COAL SEVERANCE TAX AND FEDERAL ROYALTY PAYMENTS
ON CUMULATIVE SCENARIO COAL PRODUCION, 1986-2010
(In Thousands of 1980 Dollars)

	Coal Severance Tax			Federal Royalty Payments		
Year	Rosebud Co.	Powder River Co.	Total	Rosebud Co.	Powder River Co.	Total
1986	$ 1,797		$ 1,797	$ 398		$ 398
1987	3,912		3,912	2,315		2,315
1988	7,824		7,824	4,630		4,630
1989	10,854		10,854	6,450		6,450
1990	10,854		10,854	6,450		6,450
1995	22,320	$ 1,860	24,180	13,245	$ 1,104	14,349
2000	25,746	17,712	43,296	15,145	10,485	25,630
2005	26,838	36,423	63,231	15,908	21,589	37,497
2010	16,686	51,912	68,598	9,900	30,800	40,700

Source: Western Analysis, Inc.

Printing and distribution costs were paid by Western Energy Company pursuant to Title 75, Chapter 1, Part 2 MCA.